

AROUND THE CAMPFIRE - RESILIENCE AND INTELLIGENCE

Cumulus Conference Proceedings Rovaniemi 2019

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AROUND THE CAMPFIRE - RESILIENCE AND INTELLIGENCE

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**Cumulus Conference
Proceedings Series**

**Cumulus Association of
universities and Colleges
of Art, Design and Media**

Rovaniemi 2019

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Conference Chairs' Welcome

Dear conference attendees,

Welcome to the CUMULUS Rovaniemi 2019 conference! We are delighted to have you visiting our city and university at the Arctic Circle in Lapland, Finland! This conference brings us to the northern-most location of CUMULUS conferences, where the fragile nature and the traditions of North meet the academic world. At the time of the conference, the weather can still be crispy, but the nights are light and full of the polar summer's magic.

CUMULUS Rovaniemi conference theme 'Around the Campfire' reflects how, since ancient times, people have gathered around the fire together as a community. People have sat around the campfire for its warmth and light, but also to enjoy each other's

company and to share stories and news. Likewise, it is our aim that we as the CUMULUS community get together to share our knowledge. The conference provides us a forum to discuss the new trends in art and design research and education, and experience the global CUMULUS community.

The conference would not be possible without the help of many, many volunteers. We wish to thank the organizing committee, the local organizers, the CUMULUS organization, and all who have contributed to the success of the event. We hope that you return home with fond memories, as well as with new knowledge and inspiration for your work!

Satu Miettinen

Conference Chair

Dean of Faculty of Art and Design, University of Lapland

Professor of Service Design

Jonna Häkkilä

Academic Chair

Vice-Dean of Faculty of Art and Design, University of Lapland

Professor of Industrial Design



Cumulus President's Message

The CUMULUS Rovaniemi 2019 conference

"Around the Campfire - Resilience and Intelligence" invites the global art, design and media community to its first ever gathering in the Arctic, to share the theme resilience and intelligence to respect the fragility and power of the North.

The CUMULUS Campfire symbolizes and connects people with its warm positive welcoming impact in this challenging environment, that may become more unknown, unless we collaborate and act together. The conference focuses on the topic of resilience in everyday life, geographical extremes, and societal challenges in a new setting.

What happens in the Arctic directly affects the planet. Let us find intelligent applications, embracing life-long smart, green and social innovation from the Northern point of view.

CUMULUS thanks the University of Lapland and everybody contributing to the success of the conference, uniting all Cumulusians as partners and friends.

Luisa Collina
Cumulus President

Eija Salmi
Secretary General

University of Lapland – Science and Art in and for the Arctic

The University of Lapland, established in 1979 in Rovaniemi, is the northernmost university in Finland and within the European Union. Given this location, the university community engages with issues particularly salient in the North, such as indigenous peoples, tourism, design and education. In one facet of this commitment, the institution co-ordinates the University of the Arctic (UArctic), a network of over 200 universities and other organisations in the Circumpolar North.

Internationally recognised for contributions in a number of fields, the University is working to strengthen its position as a hub of teaching and research in the Arctic. This role has become crucial as the region's communities and environment

confront the changes brought by climate change and accommodate the volatility in global economics and politics.

As a broadly-based, internationally active Arctic hub of research, art, design, and higher education, the University of Lapland builds a bridge between major Arctic and Northern research and design institutes and networks globally.

Research profile

Research on change in the Arctic and the North focuses on:

- Culture-based service design
- Northern well-being, education and work
- Responsible tourism
- Sustainable development, law and justice

People

Students: 4,300

Staff: 650

For more information about the university,
please visit: www.ulapland.fi/EN

Foreword of the Cumulus Rovaniemi 2019 Proceedings

It is our pleasure to introduce you the CUMULUS Rovaniemi 2019 conference program and the proceedings, which includes the accepted papers as well as the abstracts of accepted poster presentations and works-of-art. The conference program, and the proceedings, is organized according to the submission themes, which focus on different aspects of art, design and media. The conference includes altogether 11 paper sessions. The most popular submission theme was 'the future of design teaching', resulting in four paper sessions on the subject. In addition to the paper sessions, the conference hosts 25 working groups, design conversations, and workshops.

The papers program consists of 34 academic papers, 13 professional papers, and 4 design provocations. The review process was two-phased, including a first review and acceptance round for abstracts and a

second round for full-length submissions. The number of submissions to the papers program was 171, and the final acceptance rate was 30%. Each submission was subject to a double-blind review process, and received at least two reviews at both abstract and full-length phase. Altogether, there were 558 reviews written by a team of 49 reviewers. This demonstrates the reviewing workload on the community, and we are grateful to the international review board for their time and expertise.

In addition to the paper program, the conference has tracks for posters and works-of-art. CUMULUS Rovaniemi is delighted to offer 9 posters and 11 art pieces in its exhibition. The poster track employed a single-phase review process of abstracts, whereas the arts track was juried. We thank the track chairs for managing the process and putting together the exciting program for the conference audience.

We are exceedingly happy to host the conference with an inspiring program, which provides a versatile overview of different topics relevant for art, design and media education and research. We hope you enjoy the CUMULUS Rovaniemi 2019 conference, as well as meeting your peers from around the world!

Jonna Häkkilä & Minna Pakanen
Program Chairs

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1. Resilience and Intelligence in Design, Art and Media

The theme of resilience and intelligence are especially emphasized in Cumulus Rovaniemi. What are the means, tool and methods in design that can assist processes of growth and advancement in geographical or societal margins? How can design support and facilitate resilience? What forms do resilience and intelligence take on in design, art and media? How have resilience and intelligence been present in the various contexts of art, design and media practice? What difference does the advancing intelligent technology make and how does it contribute to resilience?

Academic Papers

Scenes from resilient matters: Graphic design changes resulting from countercultural waves

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Abstract

The purpose of this paper is to analyze how resilience is able to transform countercultural graphic design. The term resilience implies a variable degree of adaptation and the potential to create improvements on those ready to adapt and to overcome their obstacles, either of social, cultural, or technologic nature. Countercultural waves themselves tend to produce innovations in its practices, once participants need to adjust to the tough conditions they face: they are resilient, willing to find creative solutions to their purposes. The article analyzes three cases from different countercultural approaches, to assess the role of resilience in the transformations operated in each context. The first case is the counterculture of the 1960s, where graphic design defined a new identity before a large audience. Adaptive changes also happened in the 1970-80s with punk, where new low-budget fanzines, with handwritten insertions, started spreading. These examples of countercultural graphic design show a degree of resilience that result in part from low budgets and few resources, being sometimes outcast by mainstream design. However, the relationship between resilience and counterculture nowadays, the third case, suggests a shift of focus. More than low budgets and scarce materials, the challenge today, countercultural and almost stoic per se, is to find new solutions to solve problems caused by the availability of large amounts of data and the stream of fake news running through the media. The analysis suggests that resilience continues to be a shaping element in countercultural efforts, transforming graphic design.

Author keywords

Resilience; graphic design; counterculture; resilient design; fake news

Introduction

Countercultural waves rise and spread in times where the established models – either social, economic, political or cultural – no longer respond to the needs of society or at least part of it. The cyclicity of the phenomenon is thus provoked by the need of change and is (also) modeled by the resilience of its participants. In addition, counterculture is manifested through a variety of shapes and media, being enacted in different fields, from politics to art, music, design, religion, or even in the creation of alternative lifestyles (Bennet, 2012).

Rather than describing the diversity of countercultural phenomena, this article discusses the role of resilience within distinct countercultural waves/approaches: the counterculture of the 1960s, the Punk counterculture, and the strategies aiming to face today's large stream of data. The purpose is to analyze how resilience is embodied and reflected in graphic design changes occurred within underground processes.

As the term itself indicates, counterculture is a phenomenon that criticizes or goes "against" the dominant culture (Larkin, 2015). Although nowadays vastly associated with the social movements of the 1960s – due to their high media coverage – the word "counterculture" can be applied to any underground/antagonistic wave. It has occurred throughout history in many places, perhaps being as old as culture itself (Leary, 2005).

There are indeed several phenomena whose opposition towards dominant paradigms suggests a countercultural essence. Examples include the Socratic philosophy of Ancient Greece, Taoism, Zen Buddhism, Sufi Occultism, the Enlightenment, the American Transcendentalists, the bohemian Paris of the 1920s, the *Beat* generation, and the Brazilian Tropicalia of the early 1970s (Goffman & Joy, 2005). Other examples are the counterculture of the 1960s – that of the Hippies and Psychedelia – as well as Punk, the Ecstasy counterculture, Rave, or even the Acid House. All these phenomena, albeit their chronological, geographical and even structural differences, have an important element in common: resilience.

The idea of resilience is nowadays present in many fields and discourses – from the news to sports, from reports of disasters to policy papers on the protection infrastructures (Boin, Comfort & Demchack, 2010). According to Fraccascia, Giannoccaro, and Albino (2018), the concept represents the ability to adapt to change. Emerging in different academic fields, resilience ultimately depicts the capacity to "resist" adversity (Boin et al., 2010; Davidson-Hunt & Berkes, 2003).

Research on the topic reveals an interest in understanding how and why people are resilient, as well as what makes them resilient when coping with adversity (Richardson, 2002). This perspective, present in psychology and ecology studies, is useful to comprehend the role of resilience inside countercultural waves, as well as the adversities of participants. Within such contexts, resilience helps with a variety of obstacles – either social impositions, artistic dogmas, or even hard material or financial conditions. Another possible direction is perhaps that of Meadows, Miller, and Robson (2015:12), presenting resilience as a process about "how people both acquire and use resilient resources", like the ability to reuse materials and to re-contextualize design practices.

On the other hand, the literature on countercultural graphic design, either Psychedelia or Punk, describes the aesthetic, influences, and the role of this type of manifestation within each phenomenon. In the case of the 1960s, there are publications – including several exhibition catalogs – depicting the innovations on graphic design, implying a revolution within the field. The same happens with publications about Punk graphics and their “anarchic” aesthetic, perhaps to a less extent. As for the third case, research seems to be pointing towards the creation of digital means for understandable visualizations, aiming at improving access to information. However, the intersection between countercultural graphic design and the idea of resilience – to see how its changes were affected by resilient behaviors – still needs attention.

If the concept of resilience is essential to explain the developments on the social axis of countercultural waves, the same happens with its visual manifestations. The means of endurance adopted by the participants create new countercultural discourses that are also reflected through graphic design. The interest in the intersection between this practice and resilience lies in the role of the first as a vehicle of countercultural ideals. The multiplicity of voices of graphic design, as Triggs calls it (2009), push it to constant evolution. As a hybrid territory and a means of communication inside countercultural phenomena, it has become one of the most visible tools of “opposition” and an experimental hub for resilience in visual culture.

Method

To better understand the dynamics of resilience in countercultural graphic design, the article analyzes three case studies, from different periods and with different social and cultural circumstances. Each case study includes the context of that underground wave, the problems faced by graphic designers, the strategies they adopted, and the transformations on graphic design.

The first two countercultural waves – that of the 1960s and Punk – are phenomena whose graphic design played a decisive role in spreading underground values and ideas, becoming an identity symbol. The third case, unlike the previous examples, is based on a set of approaches opposed to a contemporary problem. The immense “flood” of data available nowadays makes difficult to filter and to divide content, leading to the spread of “non-information” that includes fake news, with potentially dangerous consequences. Nonetheless, the discussion parameters and the procedure are the same for the three cases: 1) Analysis of the context. 2) Analysis of main adversities. 3) Characterization of graphic approaches/innovations and its relation to the discussed difficulties.

The analysis of graphic design changes/strategies respects three categories: aesthetics, materials, and methodologies. The categorization aims to clarify the role of resilience in this process and is supported by examples.

As Baur (2013) states, graphic design, with a hybrid nature and working as a creative attitude, seeks to find solutions to transform society. The challenging and the research are thus part of graphic design’s evolving essence.

Case 1: Counterculture from the 1960s

The counterculture of the 1960s not only opened the “doors of perception” – following Aldous Huxley’s echo from the late fifties – but also built the stage for several social and political changes, creating a theater of revolution (Greenwood, 2016). The critical look towards the establishment, reflected in a plethora of manifestations – from social rallies to music and to graphic design – spread to several countries like a burning fuse. Those who entered the road against the dominant paradigms of the decade had to endure a considerable dose of difficulties, from institutional and social pressure to artistic discredit. Under such circumstances, countercultural graphic designers, especially those working with psychedelia, created an “inventive graphic form” that “functioned as both sign and symbol of the utopian and revolutionary goals pointed against the status quo” (Wild & Karwan, 2015:49).

The decade itself was craved by tumults around the world (Broackes & Marsh, 2016). Western society – especially the United States (US) and the United Kingdom (UK) – was under an economic boom yet confined to rigid social norms considered obsolete by the younger generation: the baby boomers. Tired of the aggressive policies of their elders, youths from both sides of the Atlantic started adopting cultural and political postures as opposed to conventional society (Blauvelt, 2015).

The graphic design from this countercultural wave visually reflected the urgent need for change, already seen in the social counterpart. Its resilient and experimental process became an effort to rethink society (Auther & Lerner, 2012).

Young designers defied the “mainstream/good design” by subverting established norms, aiming at abolishing the period’s harsh artistic hierarchy (Criqui, 2005). The impact of resilience is thus related to how graphic designers were able to produce a high quantity of influent materials, despite the marginal status of their practices. The changes resulting from this process turned graphic design into an essential ingredient of counterculture. Growing as a tool of resistance and of hallucinatory pleasure, this visual experiment achieved great visibility during the 1960s (McKay, 2005). Psychedelic graphic design – amongst others such as protest design – reached large audiences, rapidly conveying countercultural values with bohemian, exuberant imagery (Wild & Karwan, 2015).

According to Rubin (2010), psychedelic graphic design became ubiquitous and, along with music, traveled throughout the world “expanding” minds. If the US saw an exponential growth of psychedelic works with the Big Five of San Francisco – Victor Moscoso, Stanley Mouse, Rick Griffin, Alton Kelley, and Wes Wilson – the UK could count on Michael English, Nigel Waymouth, Mike McInnerney, and Martin Sharp.

As Barry Miles refers (2016), counterculture transformed graphic design. The extent of such transformation – revolutions tend to occur faster in the art world than in society itself – is related to both style matters and design thinking. That is, countercultural design not only looked different but also suffered changes in its very process. It represented a “dematerialization of static things into images, signs, and ephemera”, boosted by a search for “meditation, experimentalism

and consciousness-raising” (Clarke, 2016:254). These transformations, driven from the growing resistance to the social and artistic dogmas of that period, expanded the very limits of graphic design (Hollis, 1994).

Aesthetical and formal innovations are evident on Psychedelic posters, cover design, and on the layouts of the underground press – counterculture’s most popular media. The first element to considerate is perhaps typography. The creation of a “distorted-like” and do-it-yourself typography aimed to transport the effects of LSD into the paper. The result is a hypnotic – hard-to-decipher – lettering that made people take time looking at it, melting the boundary between designer and audience (Wild & Karwan, 2015). Examples of the undulating typography can be found in *Bill Graham Presents Grateful Dead* by Wes Wilson (1967), or Bonnie MacLean’s *The Yardbirds, The Doors*¹ (1967).



Figure 1. Poster *Bill Graham Presents Grateful Dead*, Wes Wilson, 1967.

The use of photo-collage and bright kaleidoscopic patterns conclude the psychedelic ethos – seen in Victor Moscoso’s *Neon Rose #6* (1967) or in his poster for the *Family Dog*² (1967). The introduction of organic and hallucinatory elements, provoking a new conception of space, liberated designers from the modern style constraints. By challenging both visual perception and the mainstream design practice, it created a “language” known in the underground

¹ See <https://www.moma.org/collection/works/5475>

² See <https://www.moma.org/collection/works/5418>

circles and unfamiliar to the establishment – later influencing the praxis of design. For Harare (2017) the desire for instant shock was evident.



Figure 2. Poster *Neon Rose #6*, Victor Moscoso, 1967.

Materials and production methods of the psychedelic paraphernalia also introduced changes. *Day-Glo* inks, reacting to UV light, were popularized, reinforcing the “hallucinating” aura and opening the road to the use of strident colors. The *Neon Rose* posters developed by Victor Moscoso symbolize this vibrant approach. On the other hand, machines such as the *IBM Selectric* helped to deal with deadlines and low budgets, revealing a commitment for a “new worldview through the power of images and text” (Wild & Karwan, 2015:46). The printing process was opened to graphic designers, granting them more autonomy (Hollis, 1994). Overall, if UK posters were printed with “rainbow-like” silkscreen, US designers preferred the cheaper offset lithography. Furthermore, a new methodology transformed the identity of graphic design, especially that of the poster. Unlike traditional poster design, the psychedelic poster was no longer an immediate communication transmitter, being integrated into multimedia environments where the medium itself was the experience.

Resilient and unrest, challenging mainstream design and provoking the establishment, graphic designers embarked on a one-way journey towards change.

Case 2: Punk

The Punk counterculture originated in the late 1970s and, as the previous underground phenomenon, had the US and the UK as epicenters. Music was in

the first row – from the *Ramones* to the *Sex Pistols* – with graphic design emerging from it. Both artistic practices conveyed a whole “anti” ethos that became the identity of this underground wave. The main goal of all Punk manifestations – from fashion to the sociopolitical strand – was to “snarl” in the face of authority (Poynor, 2016). That is why in Punk “the ideals of self-empowerment, motivation, action, and common cause are evident” (Mott, 2016:17).

For Ken Goffman and Dan Joy (2005), Punk is a resilient global counterculture characterized by an improvised survivalist toughness. Its energetic manifestations point in that direction, with participants undergoing a creative self-made revolt – often with limited resources – to “express themselves” (Goffman & Joy, 2005: 333). As a fresh alternative to both mainstream culture and the establishment, the phenomenon soon gained the sympathy of disaffected young people during the Reagan/Thatcher period (Duncombe, 1997; Goffman & Joy 2005).

According to Golding and Miles (2018), by the late 1970s, Rock – and its lifestyle – was the dominant youth culture, while Punk became the counterculture. Opposing both dominant society and music with enthusiasm, Punk seems to rank high at the spectrum of resistance-phenomena. It is politically subversive and aesthetically raw – with a do-it-yourself inspiration (Greenwood, 2016). This self-experimental character, perhaps one of the more lasting contributions of this counterculture, was led by its young protagonists, who were at the vanguard of change.

Although Punk is known for the blasting music scene, leading to several music-related studies, it is also associated with a graphic language of resistance (Duncombe, 1997; Triggs, 2006:70). Punk graphics, as that Psychedelic, emerged from the musical subculture, marginal to mainstream design (Poynor, 2012). Although many remained anonymous, there are some graphic designers associated with the Punk aesthetic: Jamie Reid, Barney Bubbles, and Malcolm Garrett are today considered key figures (Poynor, 2016).

Graphic designers and music fans – who also produced their own objects – revived and brought attention to a specific medium: the fanzine. As Triggs stated, these amateur and self-produced magazines functioned as “sites for oppositional practice”, and as places for “cultural communication as well as for political discourse” (Triggs, 2006:73). Fans, “ignored by and critical of the mainstream music press”, started printing fanzines as a way of representing their music and their (counter)cultural scene (Duncombe, 1997:7). Some fanzines, like *Sniffin' Glue* and *Ripped & Torn*³, became icons of the cultural insubordination of this wave (Poynor, 2016). *Sniffin' Glue*, the first Punk fanzine (1976), is the symbol of Punk’s graphic resilience – perpetrating a revolution in aesthetics, materials, and methodology. After all, it was made by a 19-year-old (Mark Perry) with what he had in his own bedroom: felt-tip pens and a children’s typewriter. His girlfriend later photocopied it at work (Mott, 2016).

³ <https://rippedandtorn.co.uk/wp-content/gallery/issuenine/no-9-page-01.jpg>

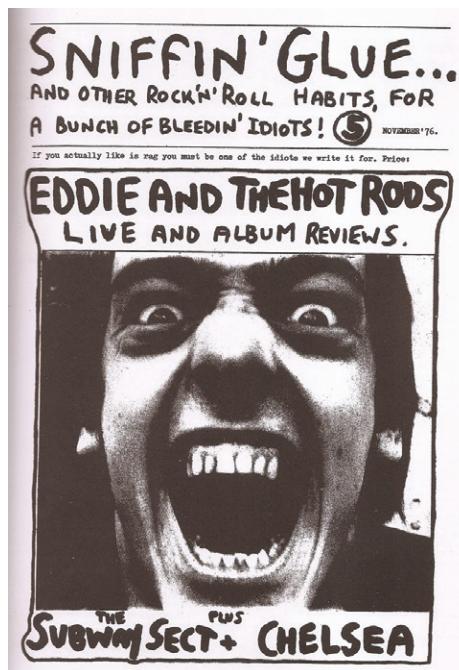


Figure 3. Cover of *Sniffin' Glue*, November 1976.

Driven mostly by low budgets, authors were producing these objects with what they could afford or already had – following their “burning need to communicate” (Savage, 2012). The random materials and cheap printing methods turned fanzines into ephemeral objects that nonetheless challenged the professional design practice. These hand-made magazines ultimately established “a novel form of communication and creation that burst with an angry idealism” (Duncombe, 1997:3).

As a marginal culture critical of the status quo, Punk graphic materials proposed a deconstruction that clashed directly with the establishment, yet later appropriated as a valid design practice. The provoking character is noticeable in the aesthetic, materials, and methodology of graphic design – raw and anarchic. The cover design of *Sex Pistols*' album *God Save the Queen*, created by Jamie Reid, is an iconic example of this explosion. Created in 1977, the year of the Queen's Silver Jubilee, the artwork presented a black and white photo of the Queen with her eyes and mouth ripped off, giving place to both the album title and the band's name. All on top of the Union Jack flag.

Distant from the mainstream practice and its technology, Punk graphics were made of hand-written elements and contained many hand-insertions, from illustrations to graphic elements such as arrows or angry scratches on the paper.



Figure 4. *God Save the Queen*, Jamie Reid, 1977.

All was fast, messy and unpolished (Budrick, 2017). Based also on cut-outs and collages – sometimes reminding the Dadaist aesthetic and a Situationist spirit – Punk dominant black color was balanced with neon highlights (Greenwood, 2016). The anonymous-made poster for the *Blank Generation Tour*⁴, of Richard Hell and Voidoids (1977), shows well Punk's approach regarding techniques and materials.

Another feature of Punk graphics – perhaps where resilience is most present – is related to the production methods, that had to respect two premises: To be fast and to be under their (low) budgets. In the case of fanzines, authors were using copy machines to duplicate the pages, turning it into “an open system, not corporatized or driven by marketing” (Savage, 2012:6). The fanzine – like posters, album covers, and flyers – followed the independent approach of Punk music, providing visual immediacy (Mott, 2016; Triggs, 2006). Overall, the graphic style of Punk looked as it did because “that was all that could be achieved using limited reprographic resources” (Poynor, 2016:21). However, with those little resources together with the strong urge to participate, Punk graphics became a means to disturb the “seemingly impenetrable wall of the system” (Duncombe, 1997:3).

Case 3: Where are we now?

This third case is not a countercultural wave *per se* – at least not how we familiarize with the term as in the previous examples – but is rather a

⁴ See <https://i.pinimg.com/originals/84/41/0a/84410a835adc24e15c7b79c09fb42ac3.jpg>

countercultural method. It is a reaction against one of the epidemics of our time: the enormous flow of data – including what we usually call “fake news”.

As in the previous examples, graphic design plays a role in the process of resisting to issues/pressures recurring from the dominant culture. This process, like those already described, requires both adaptation and creativity from graphic designers.

An important premise in this analysis is the ability to distinguish data – raw and uncategorized – from information – understandable. By this, it is not intended to elevate any specific style, but rather to discuss “what” and “how” to communicate – to do it efficiently. Nathan Shedroff distinguishes data from information already in 1994, referring that the latter is something valuable, hence requiring care in its communication (Shedroff, 2000). Access to real information may be compromised without the possibility to select, relate, and understand data. According to Wurman (2000), context observation is a precise means to distinguish both entities. Context must relate not only the environment of the data – where they come from, how they are communicated and structured – but also the circumstances of those who will interpret them. Without context, there is no information.

The advances in digital technologies and the information revolution started in the second half of the last century paved the way for the creation of the networked society, in which data production/exchange is drastically enhanced. However, the intense increase in data production is not proportional to the increase in information. On the contrary, it generates complexity – itself a challenge (Lima, 2005). Such a situation leads to the loss of real information in the middle of this chaotic ocean.

At a time in which we are “bombed” by data each second, it is difficult, yet important, to extract information. For that, the design of innovative means that allow filtering and categorizing data is crucial. Given this panorama – already paradigmatic – creating such means becomes countercultural.

The starting point to face this issue is perhaps being aware of the importance of turning data into information, as designers are responsible for empowering the public to become consumers of meaning (Lupton, 1998). A second step is to create/choose the appropriate graphic strategies and experiment it. The need for (design) methods to solve social issues is what Daniel Pinchbeck refers in *Embracing the Archaic: Postmodern Culture and Psychedelic Initiation*. In this text, Pinchbeck discusses the “systems-thinking” pioneered by Buckminster Fuller, who saw “society’s problems as design flaws that could be solved through design solutions” (2010:54). The role of the designer in this interdisciplinary process involves the research, creation, and the use of new methodologies to operate change.

Approaches on this problem vary from the creation of data visualization systems – like those on *Visual Complexity*⁵ – to the development of maps to raise awareness about fake news, or even visual ways to help the public understand

⁵ See <http://www.visualcomplexity.com/vc/>

which content is consuming. The importance of such solutions underlines that “graphic communications affect the attitudes and conduct of their audiences” (Frascara, 1988:20). If information design is the key to face complex data, the verification of data quality needs perhaps further care.

Attempts to face the problem of quality seem to be pointing at raising awareness, exploring responsible/ethical design directions. From web projects exploring the potential of “good” fake news⁶, to the deliberate use of false content to call for attention, this strategy aims to alert people for the problem⁷. Also design-school projects such as *Daily Noise* (by Annika Soja and Lena Manger), explore the relationship of fake news with the public through graphic design. This strategy not only brings design students closer to the issue but also promotes visual awareness by reconsidering news as narrative crafting, shaped according to its context (Milner, 2018).

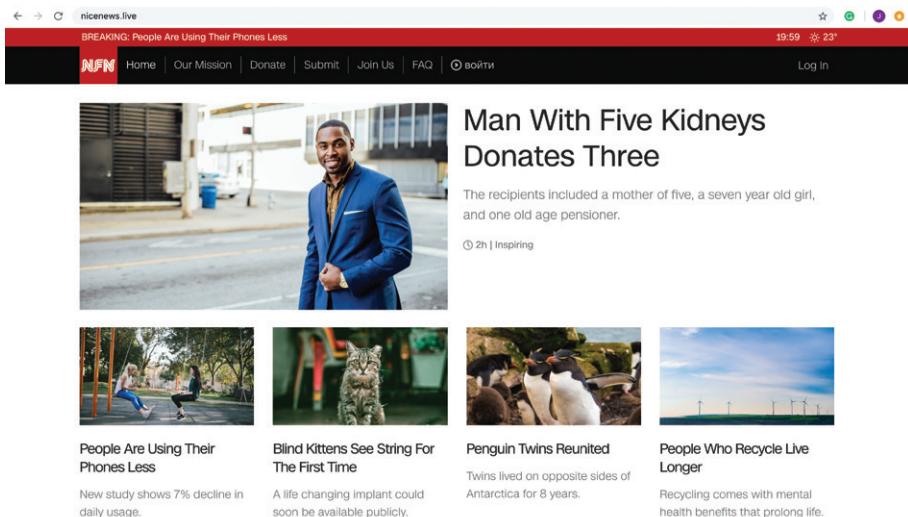


Figure 5. Nice Fake News, Oli Frost, 2018.

Other methods explore the use of graphic languages and its diverse elements – in a “visual system incorporating not only image-based symbols but also a typographic language.” (Triggs, 2006:73). In this case, components such as typography are tested as a means to distinguish real content from that fake – reliable news sources tend to stick to specific typefaces. The introduction of graphic elements allowing audiences to understand the source of contents is also a possibility.

⁶ See <http://nicenews.live/>

⁷ <https://clio-muse-prod.s3.amazonaws.com/2018-10/CJR-Insert-20.jpg>



Figure 6. Daily Noise, Lena Manger & Annika Soja, 2018.

Another approach is the use of data visualization and filtering systems, like in *A Field Guide to Fake News*⁸, attempting to trace the circulation of fake content (Bounegru, Gray, Venturini & Mauri, 2017). The aim is to map (graphically) the underpinnings of fake news sites. Such experiments take into account that fake content is nowadays used "to trigger outrage by exploiting social media virality" (Cerase & Santoro, 2018:337).

One of the challenges for the designer today is to structure data into meaningful visualizations – like Psychedelia and Punk were understood by their audiences – creating significant languages as those verbal (Woolman, 2002). Harland (2011) refers that we are in a time where technological change and political influence can affect graphic design. However, the influence seems to be circular and extended to the social context. That is, if graphic design is changed by social constraints – as a resilient effort – it can also transform society in return.

Conclusion

The intersection between resilience, counterculture, and graphic design is the main contribution of this paper. Observing the dynamics between resilient efforts and countercultural design transformations helps to understand how creators worked to find solutions for their adversities, while at the margin of mainstream graphic design.

The analysis shows that the degree and nature of adjustment/resistance seem to vary according to the social, economic, political, and artistic dogmas of the

⁸ See <https://densitydesign.org/wp-content/uploads/2017/11/fakenews-viz.png> and <http://fakenews.publicdatalab.org/>

chosen countercultural waves. The strategies adopted by countercultural designers, to endure the adversities and pressures on the three case studies, seem to be related to occurred changes in the practice of graphic design. It may be hard – and even unnecessary – to define a precise number of resilient attitudes behind those changes. Instead, it is helpful to understand the nature of these attitudes, by exploring each of the three contexts.

Each countercultural wave/approach demonstrates this endurance ability through its most used visual media: the poster in Psychedelia, the fanzine in Punk, and the digital visualization systems of today's digital era. In the first two waves, changes in graphic design include a new aesthetical approach, the introduction of different materials/production means, and new design practices/methodologies – that clashed with mainstream graphic design.

In the third case, however, perhaps due to its digital nature and contemporaneity, resilience seems to influence more the methodologic experiments, rather than the aesthetics or materials used to solve the data problem.

Resilience is not always driven by the same circumstances and its impact varies according to the nature of each case. In the first case, the counterculture of the 1960s, graphic design worked as a vehicle for underground/psychedelic ideals. Here, the impact of resilience is seen by how graphic designers overturned "good design" rules. The lasting impact of this type of design is related to the methodologic and visual free experimentation – with the graphic objects themselves becoming the content. It is also present in collaborative design, and in the idea of design as a cultural building part. In the second case, the Punk counterculture from the late 1970s, low-budgets were a decisive factor for the capacity of adaptation, with the consequent creation of solutions to overcome difficulties. The result was a do-it-yourself aura supported by the use of common/household materials and technology that revolutionized the graphic design of that period. Repercussions of this style, beyond the hand-made aesthetic, include the experiments of deconstruction in graphic design. This second case study, through the use of a free compositional method, demonstrates to be influenced by the first.

The third case reveals a different nature, hence in need of other types of approach. Its future implications will be possibly distinct from those previously described. This contemporary countercultural attitude attempts to create design experiences – mainly through digital interfaces – aiming to improve access to meaningful information. Contemporary graphic designers, either using collaborative design strategies, or those of deconstruction – graphic or mental – are nonetheless being inspired by the legacy of the previous underground waves.

It is important to underline that both the counterculture of the 1960s and Punk were phenomena with sociopolitical movements and important musical/visual scenes – all fighting against the status quo. Their graphic innovations were the visual reaction of the ongoing clash. On the other hand, the third case is still in need of attention from graphic designers. The design of awareness models, well-sequenced visualization systems, and perhaps of graphic solutions that guide the public towards a conscient source choice, are thus possibilities to stand against the paradigm of data.

Graphic designers, regardless of their countercultural context, use resilient approaches when creating new solutions to cope with the adversities caused by either the dominant culture and the dogmas they want to remodel. In all the discussed case studies, more than a problem solver, resilience proved to be stimulating change, either in its social axis and within graphic design.

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The Role and Significance of Art and Culture in the Reconstruction of Lapland in the 1940s and the 1950s

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Abstract

After the Lapland War (1944–1945), Lapland from Rovaniemi to the north was destroyed by German troops. The whole of North Lapland was a miserable scene: all that was left standing in the villages were some blackened chimney stacks. When evacuated people returned to their homes, they needed innovations, new ideas, creative thoughts and imaginations to survive in the harsh conditions, but they also needed resilience, which is a toughness and capacity to recover from difficulties, to overcome the trauma, material and mental loss of the wars. This paper aims to analyse the role of art and culture in the mental survival of people during the reconstruction period and to ask whether and how *Seitapiiri*, the Lapland Art Association, supported resilience. After World War II, Finnish people had to adapt a new set of values. The national esteem had experienced a severe blow, and the wartime experiences were difficult to handle. Through art and culture, people sought resilience and balance in life and confidence for the future. The exhibition, meetings and events organised by *Seitapiiri* offered varied, emotional refreshment and created a sense of community and cohesion. The cultural and art activities helped the displaced population and new inhabitants to settle down.

Author keywords

Resilience; flow, art experience; *sisu*; World War II; mental reconstruction; visual representation; *Seitapiiri* the Lapland art association; War of Lapland.

Introduction

The Lapland War (1944–1945) was a fight between former brothers-in-arms: the Finns and the Germans. The Winter War began with the Soviet invasion of Finland on 30 November 1939 and ended three-and-a-half months later in March 1940. The attack was deemed illegal all over the world (Vahtola 2012, 362–366). World War II was occurring simultaneously, and Finland did not get international support, only sympathy. During the short peaceful period, Finland desperately looked for an alliance to provide military support, and Germany promised to help. Five divisions of the German army in Norway moved to Finnish Lapland; Rovaniemi was their main military centre (Vahtola 2012, 371–372). Germany began its military operation against the Soviet Union in June 1941, and a few days later the Soviet Union attacked Finland (Kulju 2014, 14). The Continuation War thus began.

The Finnish front had been divided between the German and Finnish troops so that the Finns were responsible for the southern front and the Germans for the front in Lapland. In the first phase, the troops succeeded and proceeded far into the Soviet Union. After they lost the Battle of Stalingrad in February 1943, however, Finland realised that Germany would never win World War II; Finnish politicians thus began to formulate how to make peace with the Soviet Union (Kulju 2014, 37; Vahtola 2012, 374).

Finland made a separate agreement with the Soviet Union in September 1944, which was the reason for the Lapland War between the Finns and the Germans. The Soviet Union gave Finland two weeks to get rid of German troops, which was impossible because in North Finland there were more than 200,000 soldiers and other army workers (Tuominen & Löfgren 2018, 25). Almost the whole population of Lapland—103,885 people—were evacuated. More than half were transferred to Sweden, and the rest moved to the Finnish Ostrabothnia. The Lapland War ended in April 1945. On the way from Rovaniemi to Norway, the German troops destroyed all roads and bridges and almost 50% of the houses. Rovaniemi and many villages were burned to the ground. The whole of North Lapland was almost destroyed. However, the evacuees suffered from homesickness and wanted to return home to Lapland as soon as possible to reconstruct their homes and lives (Hautala-Hirvioja 2017, 152).

This paper discusses the role and importance of art and culture in Lapland during the reconstruction period of the 1940s and the 1950s. The research material is based on the versatile and active actions of *Seitapiiri*, the Lapland Art Association. The group's protocols and exhibition catalogues in the collection of the Provincial Museum of Lapland, exhibition reviews and critics in newspapers, articles from *Kaltio* magazine from the collection of the Provincial Library of Lapland and artwork made by *Sietapiiri* members from 1945 to 1965 compose the research material. The exhibition *Uuteen aamuun* (Waking up to a new morning), curated by me in the *Rovaniemi Art Museum* from 20 October 2017 to 4 February 2018, collected artwork from a group of almost 400 pieces of art; 150 pieces from 46 artists appeared in the exhibition. The texts were analysed with content analysis (Rose 2012), and artworks were analysed with reference to art historians Erwin Panofsky's (1972) and Ernst Gombrich's (1991) approaches to understanding and interpreting visual representations and their connections with other contexts of history, culture and society.

The theoretical background of this article is in art and cultural history but also in the idea of resilience and positive psychology. The word resilience is based on the Latin word *salire*, which means jump or bounce, and *re-salire*, which means to bounce back—hence resilience's definition of recovering after difficulties or a traumatic situation (Pojula 2018, 16). Licensed psychologist and psychotherapist Soili Pojula (2018, 19) writes that 'resilience means man's ability to adapt effectively to a stressful experience or trauma'. It is also the ability—not an innate human feature but rather a process—to start again and find a way to rise from the ground or ashes (Lahti 2014, 330). An atmosphere of positivity is important, as well as certain abilities, such as interest, trust, respect, rejoicing and bravery, and being inspired by creativity (Saarinen 2018).

According to social psychologist Emilia Lahti (2014, 320–324), the Finnish word *sisu* is difficult to translate. It is near the English word 'grit', but *sisu* is more; a person tries even when something seems to be an impossible mission. *Sisu* can increase the ability to respond to challenges and can be a channel, even a prerequisite, for resilience (Lahti 2014). This *sisu*—intense and persevering grit—was presented as the foundation of Finnishness, becoming part of the national identity in the 1920s and 1930s. Pojula (2014, 27) comments on the situation: 'Finland's survival from the Second World War is an internationally renowned embodiment of resilience'. During wars, this attitude united the Finnish people; during the reconstruction period, it strengthened and helped people to work hard. Finnish *sisu* was one of the most important factors of why Finland paid all reparations to the Soviet Union and rose up quickly after being destroyed by the war.

Establishment of *Seitapiiri*, the Lapland Art Association

In the 1930s, there flourished tourism in Lapland. New modern hotels and the beginning of private motoring in the 1920s and 30s increased the number of visitors to Lapland (Hautajärvi 1995, 44). After the Lapland War, old and attractive Lapland was gone; hotels were burnt, and roads and bridges destroyed. In North Finland, people felt that no one in South Finland was interested in the culture and life of the peripheral northern areas. Artists and writers felt that the atmosphere was negative, and they decided to found a cultural magazine, *Kaltio*, to support and promote humanistic values. The first issue of *Kaltio* came out in 1945; six issues are still published every year (Hautala-Hirvioja 2017, 14).

The evacuees from Sweden came back to Lapland little by little at the end of 1945 and during 1946. The writer and painter A. E. Järvinen himself returned to Rovaniemi in the spring of 1945 and began to rebuild his house. Journalist Erkki Hynynen (1947, 9) wrote, 'For over half a year, he [Järvinen] had to live in a front of room sauna, that was about as big as a cord of wood. During that time, he had essentially no opportunity to pursue his literary or artistic plans if for no other reason than the fact that the room was not big enough to hold a table'. In the summer of 1946, the Lapland Regional Council organised first Lappish cultural festival celebrating homecoming that also included an art exhibition. Ten years later, A. E. Järvinen recalled, 'It was quite a shocking event, but at the same time, it brought people together. There existed the old Finnish spirit like in the *Kalevala* epic—people were singing on the ruins of their homes' (Cit. Hautala-Hirvoja 2017, 152).

There was a real need for Finnish *sisu* when families began to rebuild their homes. As there was a lack of building materials, people collected nails from the ruins, straightened them and reused them. The recycled nails had strong symbolic meaning: a new hope began to dawn (Hautala-Hirvioja 2017, 152). Hope and trust form the basis of resilience, because they are important factors in maintaining joy and happiness (Pojula 2018, 28). Autonomy, volunteering, competence and cohesion or relatedness are the needs that guarantee the best results in work, motivation and wellbeing (Martela 2014, 47–49). Good, positive relationships within the family but also outside the family helped these people. Having a strong network of friends is a valuable component of building resilience (Pojula 2018, 172). Working together and different hobbies increased cohesion and wellbeing among people in Lapland. Different community efforts like harvest bee and sewing bee were common before and during the World War II in Finland.

In Lapland and in Rovaniemi, there was a lack of exhibition space, requiring a lot of imagination to organise art exhibitions. A. E. Järvinen showed art to an audience in his recently rebuilt house, while other artists organised small exhibitions in temporary storehouses (Hautala-Hirvioja 2017, 14). Soon, it was clear that people did not only need hard work but also needed entertainment and relaxation. Also the Lapland Regional Council organised a second Lappish cultural festival in Rovaniemi in the summer of 1947. There was an exhibition of Lappish visual artists (Hautala-Hirvioja 2018, 100).

Two cultural festivals and small private exhibitions were felt to be important in normalising life. There was a real need to establish an art association for all different kinds of art and culture for the whole of Lapland (*ibid*). In November 1947, fifteen friends of art and culture decided to start the Lapland Art Association, whose activity ended in April 1975; one young painter, Helmer Selin, made up the name *Seitapiiri* (Hautala-Hirvioja 2017, 19–23). In English, *Seitapiiri* means 'the Circle of Sieidi'. In ancient Sámi cosmology, sieidis were holy places or sacred natural objects to which Sámi people sacrificed. Perhaps the first members of *Seitapiiri* felt that they had sacrificed Lapland for the rest of Finland; nevertheless, the name connected this destroyed and reconstructed north area to its past.

Lapland Culture Weeks as a Part of Resilience

The original task of *Seitapiiri* was 'to support and to cultivate the members in their artistic efforts and to take care of educational and culture aspiration among the population in Lapland' (Cit. Hautala-Hirvioja 2018, 101). The association gathered visual artists and writers, enthusiasts of music, theatre and all who were interested in art and culture. After the establishment of the association, *Seitapiiri* hosted a literature matinee; a couple days later, it arranged an art exhibition with forty artworks (Hautala-Hirvioja 2017, 19).

The first Lapland Culture Week occurred in November 1949 and consisted of a literature matinee, theatre, music performance and an art exhibition. The whole week was a success. In the Rovaniemi area, the population was about 14,000 people; about 7,000 of them attended the events of the Lapland Culture Week. *Seitapiiri* continued to organise the culture events and exhibitions until November 1967—an exemplary demonstration of active involvement, cooperation and strength (Hautala-Hirvioja 2017, 25).

Seitapiiri's members worked voluntarily without any salary. They had great interests and skills in art, music and writing, which promoted trust, self-confidence and self-esteem. Later, there were outsider curators who chose artworks for exhibition. The jury and the criticism of the newspapers gave the artists feedback on their art. According to psychologist and psychotherapist Soili Poijula (2018, 114), respect from an artist's intended audience supported a positive self-perception for the artist, as well as confidence in their strengths and abilities. After a disaster, social support and community are important, because they have a clear connection to vitality, strengthen physical and mental health and increase resilience (Poijula 2018, 178, 181). The exhibitions and events of the Lapland Culture Week were important to the audience, consumers of art and culture itself. One person recalled that there were a number of people observing art made by artists from Lapland and discussing the art such that they forgot daily routines and building efforts (Hautala-Hirvioja 2017, 25). The Lapland Culture Weeks and exhibitions gave happiness and joy to organisers and viewers alike.

Meetings and Art Courses as Empowering Acts

Once a month, *Seitapiiri*'s members gathered to discuss art and culture issues in the newly rebuilt hotel *Pohjanhovi* or in schools. Looking to the future, they made initiatives to acquire public works of art and establish an art museum (Hautala-Hirvioja 2018, 103). Themes for the meetings included lectures on art, history or philosophy. As early as February 1948, the members of *Seitapiiri* discussed and worried over the following issue: Is visual art too simple and one-sided in topics? Most of the paintings depicted landscapes. They tried to solve the problem themselves; artists gathered to draw a model and paint still lifes together (Hautala-Hirvioja 2017, 26).

That was not enough, however. *Seitapiiri* decided during the summer of 1951 or 1952 to organise art education for artists and amateurs in Rovaniemi. The first painting camp was organised in 1953, after which it was arranged somewhere in Lapland every summer until 1965 (Hautala-Hirvioja 2017, 33). Art education, art courses and camps were new in Lapland. They were very innovative solutions. Even amateurs from South Finland attended the courses. Lapland was exotic for them, and art teachers were high-level Finnish artists.

Optimism and a positive attitude gave people the power to decide and manage their situation and destiny. Their actions showed their efforts to participate in activities, their genuine interest and curiosity and their needs to experience the meaningfulness of life (Poijula 2018, 17, 212). This increased their resilience and strengthened their survival despite the mental and physical pressures of the reconstruction period.

Art as a Medium to Express and Release Feelings

Art is an open system that provides much freedom. There is no right or wrong in art, only different kinds of versions or expressions. Artists and amateurs have the freedom to depict whatever they want. Sometimes art can continue to express feelings when words or speech are too meaningless or weak to convey deeper experiences. One important aspect in making art is 'flow'; some scientists alternatively call this 'prosperity' or 'flush'. In positive psychology, it is also known as the mental state of operation for actions with full involvement

and enjoyment. A person can lose his sense of space and time. The positive and strong experiences reduce heart rate and blood pressure and positively affect breathing, food digestion and sleep quality (Uusitalo-Malmivaara 2014, 21). Then both positive emotion and action are present at the same time (Pojula 2018, 22). These emotions and experiences help a person feel free, coherent and solid.

Flow is involved in making art, but an aesthetic experience arises in response to works of art or other aesthetic objects or nature. Aesthetic experiences are the most complete, the richest and the highest experiences possible (Vuorinen 1996, 345). Both flow and deep experience make a person forget the hard work they face and relax. Enlightenment, being overwhelmed with beauty or an exaltation of art work are similar but are more than an aesthetic experience. Enlightenment has been described as a communal feeling because it motivates people to do things to achieve a common good. It helps in engagement and increases cohesiveness, atrophy and empathy (Pojula 2018, 205). This kind of ecstasy is an almost holy experience and is possible to feel in art, nature and religion. A young woman Helka Forsmna who came back to burnt and destroyed Rovaniemi felt that nature was familiar and perhaps more valuable and significant than before. She wrote about her strong experience in her memoirs:

'It was Midsummer 1945. There were no ordinary Midsummer celebrations at Ounasvaara Hill. Still, I went to see the Midnight Sun with my friends. It was a particularly beautiful and bright night. The sun was shining in a cloudless sky above destroyed Rovaniemi. And nature! It was blooming and sceneries were pleasing to the eye. I thought my heart would break' (Cit. Hautala-Hirvjoja 2016, 160).

Positive art and nature experiences add good feeling and well-being. Interestingly, strong and negative experiences can be positive and cathartic. Catharsis, an idea based on a metaphor originally used by Aristotle, is the purification of extreme emotions like fear or horror (Vuorinen 1996, 68–69).

Landscapes as a Main Theme During the Reconstruction Period

Cultural historians, such as Ville Kivimäki, Mervi Löfgrena and Marja Tuominen, have written about silence and its many variations. After World War II, many traumas were so deep that there were no words or power to talk about them, resulting in people choosing silence (Kivimäki 2018, 35). In Lapland, there existed polyphonic silence, wherein many historical happenings had been absent or forgotten in Finnish history; this silent mental recall is still occurring (Löfgren & Tuominen 2018, 31). It was not necessary to speak, as trauma and bad feeling could be handled by art, such as painting the feeling of evil as *Seitapiiri*'s members did. Only a few paintings depicted the disaster or the reconstruction of Lapland, however. Landscapes and nature were the most popular motif.

Research revealed that there were only five artworks depicting destroyed Lapland. One was a quick drawing and two were watercolours where snow smoothly covers the ruins and softens the shapes of the charred and black foundations and chimneys. These three artworks had been made in the

spring-winter period of 1945. As late as 1965, Harry Porko painted the expressive watercolour *Year 1944*. It portrays the burning houses and crashing electricity pylons. In the early 1950s, Kittilä municipality ordered four oil paintings—*Old Kittilä*, *Destroyed Kittilä*, *Rebuilding of Kittilä* and *Rebuilt Kittilä*—from Einari Junttila. The first two artworks were completed in 1952 and the two others in 1963 (Kastemaa 2002, 45). *Destroyed Kittilä* is also a winter picture, but it acts like evidence of the burnt village, where the church—the only surviving structure—stands behind the ruins. The atmosphere is dark, empty and freezing, with wind blowing through and snow shining on the burnt village. The impression of *Destroyed Kittilä* is submissive and realistic. It was based on the artist's own experience, as the Junttila family lost their home and belongings in the disaster of Kittilä (Kastemaa 2002, 41).

According to Tuominen (2012, 67) the traumatic experiences and feelings intensified and found one release in 'frenzied work bent on getting things finished'. Although rebuilding was an essential part of everyday life other artists, except Junttila, did not depict it. Perhaps artists wanted to use their scanty free time to paint something else. Economic life was represented in public painting. Art historian Johanna Ruohonen noticed that public painting was a significant genre of art in post-war Finland. Behind the genre was the democratic idea that art belonged to every citizen, commissions would support the artists and education for citizens would reflect the values of the Finnish society. Public art can also function to minimise spiritual damage and give hope for future (Ruohonen 2013, 106, 245).

The public and private artworks and altarpieces in Lapland were destroyed in fires. Public paintings were thus commissioned for public buildings and religious art for rebuilt churches. *Seitapiiri* member Aarne Hamara, a self-educated artist, painted a large public painting named *The Development of Structure of Livelihood in Lapland* in 1949 for the new municipal hall of Sodankylä. The painting, like many other artworks, includes a view of a mountain landscape, but there are also human beings: Sámi taking care of their reindeers and farmers working their fields (Ruohonen 2013, 110). *Seitapiiri* members discussed in their meetings public art, especially about the bronze statue *The Lumberjack*, which was made by Kalervo Kallio in 1955. *The Lumberjack* was a tribute to past generations and their work, but it was also an example of the reconstruction of Lapland (Hautala-Hirvioja 2017, 23). The bronze statue represents hard work and Finnish *sisu*, showing people that struggle and concerted effort will lead to a better future.

Nature had been a shelter for Finns during the hard and dangerous periods, and it had fed them in periods of famine. Since the beginning of the 1800s, nature and landscapes played an essential role and had a firm place in the themes of Finnish art. Patriotism and identity were linked to nature: forests, lakes, hills, fells and wilderness. Lappish landscapes became famous with the tourism boom just before the Winter War. From the 1910s to the mid-1950s, Finnish art was figurative and representative; its style was modern with impressionistic and expressionistic features. This was also the style *Seitapiiri*'s artists used to paint landscapes during the reconstruction period. It seems that the artists in Lapland did not want to remember the war; perhaps the harmony of nature was a symbol of a new and peaceful world. It may be that the artists wanted to combat the total destruction of Lapland and loss by

expressing a positive attitude and hope through their art. (Hautala-Hirvioja 2017, 37–41.)

Lappish artists like Aarne Hamara, Einari Junntila, A. E. Järvinen and Uuno Särkelä began their careers in the 1930s and embraced the idealised depiction of Lapland in the spirit of Finnish patriotism. After the war, they resumed their bright depiction of northern landscapes. Contemporary critics considered their art a little conservative, but their works exhibited profound local knowledge and authentic experiences of nature. They were able to paint foggy swamps, freezing waters, snowstorms and meltwaters of spring (Hautala-Hirvioja 2018, 104, 107). Pentti Maatela painted *Scene from Pekankatu Street* (1946) in Rovaniemi. The town was totally destroyed in October 1944. The foreground in the composition shows green grass and barracks. Behind them are white houses and a bright blue sky; no ruins are visible, and the scene could be placed in any summery town. It was easy for the public to know and identify landscapes of Lapland and Rovaniemi at the level of the senses and feel integrity and wholeness in response, which increase resilience.

It was need for *sisu* that drove artists to make painting trips outside the villages and towns in Lapland. Roads, bridges and whole infrastructures had been destroyed, with many trails and roadsides mined. Einari Junntila's painting *Nattaset Fell* (1946) represents a fell scene situated 230 kilometres north of Rovaniemi. The composition is dominated by snow-covered swamp and fell tops on the distant horizon. Although the landscape is white and looks innocent and pure, the light and shining expanse of snow conceal the marks and dangers of the war. There were long traditions in Lapland of making use of what nature had to offer. For men, hunting and fishing brought recreation and made them forget reconstruction for a while. Sitting around the campfire, they could discuss feelings and traumas caused by war. A. E. Järvinen was well-known as a wilderness writer and painter. He depicted the lives of hunters and fishermen in his books and paintings. In his stories and watercolours, nature is both backdrop for events and an actor itself. His oil paintings, like *The shooter of frost-covered wood grouse* (1950), were based on his experiences as a hunter (Hautala-Hirvioja 2018, 105).

Generally in Finland, the visual arts and war had very little to do with each other (Mikola 2016, 92). There are only a few artworks that depicted death, soldiers, wounded persons or fights. After the war, art was commissioned to create memorials and monuments in connection with graves of the deceased in the wars. During the 1950s, they were humble and realistic monuments serving as common places for bereaved relatives. More creative and artistic monuments were made in the 1960s (Mikola 2016, 87). Many Lappish war memorials had been made by the only sculptor who lived in Lapland: Ensio Seppänen. His motives for his art and the memorials he created in general tried to convey the understanding that the faith of an individual was not only his own but was the destiny of the whole nation. The memorials also proved to his intended audience that life continues, that the Finnish nation still exists and that people in Lapland are strong enough to rebuild the country (Hautala-Hirvioja 2017, 139).

Conclusion

Sitapiiri, the Lapland Art Association, had an important role as the promotor of visual art, as the organiser of the whole culture in Lapland and as the supporter of resilience in the mental construction of the Lappish people. After World War II, Finnish people had to adapt to new values. The national esteem had undergone a severe blow, and wartime experiences were difficult to handle. Through art and culture, people sought balance in life and confidence for the future (Hautala-Hirvioja 2017, 153). *Sisu*, the Finnish special grit, and art- and culture-based resilience helped the Lappish people in their hard work.

2013, 110). The Lapland Cultural Weeks and other events organised by *Seitapiiri* offered entertainment, as well as emotional and educational refreshment for the resilience and empowerment of the people. A large number of people moved to Lapland from other parts of Finland. The cultural activities and association helped them to settle down and feel at home, thus increasing societal cohesion. The roots of many professional culture units working today, such as the Rovaniemi Theatre, the Lapland Chamber Orchestra and Totto—the Rovaniemi Native Region Association—existed in the activities of *Seitapiiri* (Hautala-Hirvioja 2017, 23).

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Designing for Interaction and Integration: The Artistic Migrant Persona

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Abstract

In the past two decades, design has evolved from being undertaken in isolation by designers, and being at the cosmetic end of the decision-making processes, into being a more user-centered, empathic and participatory process. The advance of design thinking, as a proven, repeatable and creative problem-solving method, not only made it a popular tool for many non-designers, but it also caused designers to build confidence for tackling more complex and comprehensive problems in different realms. As designers stopped *assuming* the needs of the users/audiences and focused on investigating their *actual* experiences to meet their requirements, we started to have very powerful tools in design for social change. This research, that is still in progress, as part of a European Union H2020 RISE-funded project called *Trans-making*, aims to discuss these issues to explore how the immigrants adapt to the new cities where they settle, how they relate to their new environments and how they *belong* to a new place. Hence, in this context of displacement, resilience can be investigated in two-folds: In the resistance of the receiving cultures in opening up to newcomers and the resilience of the migrants, so that they can survive in a new culture which is not their own. Yet, Manzini's definition of resilience brings about a third-fold which coincides with the direction this research has taken. As of February 2019, forty-three semi-

structured, in-depth interviews were carried out in Paris, Izmir and Havana, with artists, designers and architects that have migrated from their countries of origin temporarily or permanently. More interviews are to be carried out in Valencia, Palermo, Ljubljana and Berlin. Eventually, the aim of the research is to synthesize the experiences that were gathered through these interviews and interactions and to use the design persona method to develop a *migrant persona*, which then, can be used to meet the needs of migrants in different scenarios of adaptation and resilience.

Author keywords

Displacement; intercultural communication; placemaking; cultural adaptation; design persona.

Introduction: Communication, Design and Social Change

Stepping Stones (2016), is a unique picture book by Margriet Ruurs, that tells the story of a family that had to “flee the horrors of war” in Syria, to take refuge in Europe (Ruurs, 2016). Its ingenuity and tenderness comes from the art and the artist that it features: the story is illustrated with the images composed entirely of stones. The artist, Nizar Ali Badr, dismantles his stone sculptures as soon as he finishes and photographs them, because “affixing stones with special glue onto special supports has become far too expensive [these] days” (Youssef, 2015). An interview with Badr appears in Youssef’s project “*Creative Havens: Syrian Artists And Their Studios*,” a project that aims to reveal the complexity, pluralism and wealth of Syrian art “in a deeply humanistic and apolitical perspective”. On the website, Youssef also defines the project as “a cry of hope launched towards the blue of the sky, a universal cry of hopefulness, respect and life towards the people of Syria and all the people of the world”.

This project, this book and many other artworks have touched audiences in ways that no news coverage could, created awareness on the plight of the displaced populations. All kinds of displacements indicate a rupture in the communication processes and through these works, we can hear “the cry” for the social dialogue in which one’s identity lives and survives, one that demonstrates the insatiable need for relationships, through which we communicate our needs, and express our ideas, values and assumptions. Hence this tiny book became an inspiration to develop this transdisciplinary research on intercultural communication, to help tackle the *wicked* need for communication that arises in the migration from one culture to another.

Communication represents significant aspects of a culture and it is crucial to the survival of any culture as well as for any group of human beings. Viewed this way, it follows that, when a person’s ability to communicate is blocked or distorted, s/he is separated from the context in which s/he finds meaning and a sense of identity. Being forced to leave one’s home behind –even leaving it voluntarily, in prospect of better socio-economic conditions elsewhere– is a rupture that initiates a deep, tenacious alienation process, and it rapidly creates a vicious cycle: The alienation is created by the lack of communication and can only be alleviated by improving the communication possibilities, yet

nevertheless, in the case of a displacement, communication becomes the hardest thing to acquire. Moreover, displacements bring cultural dissonances and incompatibilities, as a person, while leaving his/her home, also leaves behind his/her original culture and mother tongue. And when different cultural and ethnic stereotypes –that are strengthened by the media– are also added to this confusion, what we have in our hands is a *wicked problem*. Wicked problem, a term originally used in social planning, but currently adopted by design thinking, refers to problems that are quite difficult to tackle in scientific objectivity, as numerous subjectivities are at the core of such problems.



Figure 1. Stepping Stones, by Nizar Ali Badr (2016). Image from Sandro Kancheli's animated film featuring Badr's stone sculptures, as part of the "Images of the East" project by Gidon Kremer and Kremerata Baltica (2016). <https://bit.ly/2BFO68e>.

In the recent years, one of the biggest problems human societies faced was the forced displacement of large numbers of people from their countries of origin, due to unfavorable conditions in various parts of the world. Devastating for the displaced, these movements had, and are having, strong impacts on both the source and the destination. Worldwide, more than sixty million people have been displaced by war, persecution or human rights abuses (Grandi, 2016). Though there are huge gaps between the adaptation problems of the refugees, migrants and expats, this research aims to develop a basis for integrating newcomers in their new cultural settings, a basis for migration, intercultural communication, and communication as developer of relationships, borrowing from design and communication studies to suggest a key persona that could be an agent of these adaptation processes: The artistic migrant persona.

This persona belongs to Richard Florida's *creative class* in that it helps unleash the creative potential of a resilient society, and hence it creates a possible opening for intercultural communication, because this "unleashing requires an open culture —one that does not discriminate, does not force people into boxes, allows us to be ourselves, and validates various forms of family and of human identity" (Florida, 2005, p. 5). And in this context, intercultural

communication is not only *for the sake of* the immigrants. Instead, it is at the core of the contemporary resilient society –if not all societies at all times– as culture “affects economic growth by producing incentives that promote effort, thrift and hard work”, as was argued by social and economic theorists from Max Weber to Edward Banfield and Daniel Bell. Hence the potential of the *artistic migrant persona* is a significant one, as creativity is considered as a driving force for global economy and for creation of new jobs. In Florida’s words, human creativity is a limitless resource of human capacity and a real source of economic value-creation, “an intellectual construct that extends to all forms of human potential” (Florida, 2005, p. 4), and is also a great leveler, “it defies gender, race, ethnicity, sexual orientation and outward appearance”: “We cannot know in advance who the next Andy Warhol, Billie Holiday, Paul Allen, or Jimi Hendrix will be, or where he or she will come from” (p. 5).

Design thinking have taught us, that once a design problem is defined, wicked problems are better solved with less-objective, yet creative solutions, and these solutions are more expected to come by through empathy that is formed between the designers and the *users*. In design processes, this empathy is obtained mainly through qualitative research, ethnographic interviews and persona development (Cooper, 2004, 2007; Hassenzahl, 2014; Kelley, 2001; Nielsen, 2014). Building on the contextual inquiry method of ethnographic interviews developed by Hugh Beyer and Karen Holtzblatt (Cooper, 2007, p. 59-63), this research focuses on real experiences of artists, designers, architects and sometimes other intellectuals/creatives, who have left their country of origin to live and work in another country, context and culture – temporarily, or permanently. The objective was to develop a phenomenological understanding of the adaptation processes, with a deliberate focus on intercultural communication and misunderstandings, as they create “incidents of noise” in communication, which than exert “a detrimental effect on level of cooperation” (Van Lange et al, 2002, p. 768). Thus, focused, semi-structured, in-depth interviews were conducted on samples of 15 people from the artistic communities at each location, to look for common misunderstandings, hardships, cultural conflicts and shared, universal values in the processes of adaptation.

Defining the Design Problem in Cultural Adaptation

In 2015, when more than a million refugees arrived on European shores, the reaction in many countries quickly turned to tightening border controls and erecting fences. Public opinion became increasingly alarmed, with some politicians stoking fears and augmenting tensions. In accordance with urban paranoia (Knox, 1982, p. 25), together with Gerbner and Gross’s “mean world syndrome,” this reaction is strongly related to a subjective view of the world. Cultivated and strengthened by the media in each country, when it comes to immigrants, people have a tendency to believe in what they see in the “television world,” to be their actual belief about the “real world” (Shanahan, 2009, p. 264).

Ezio Manzini, in his highly acclaimed book, *Design, When Everybody Designs* (2015), defines resilience technically, as “diversity, redundancy and continuous experimentation,” but he also maintains that the corresponding society that is to bring social innovation, “must be a diversified, creative one”. This research had previously defined two-folds to investigate resilience, in the

context of displacements and intercultural communication: In the resistance of the receiving cultures in opening up to newcomers and the resilience of the migrants, so that they can survive in a new culture which is not their own. Yet, Manzini's definition of resilience brings about the possibility of a third reading: The first two contexts, in which we consider resilience, would paradoxically create a barrier to the proliferation of the resilient society. Manzini holds that cultural diversity and creativity must be integral parts of any scenario that concerns resilient societies, (2015, p. 22), nevertheless, a receiving culture's resilience may itself be the barrier that would hinder such diversity. If resilience comes to mean incapacity to open up, adapt to or accept cultural diversity, which is essential to building resilience in the first place, then we should look for a way to overcome the atrophic media propaganda that creates "others" and a big barrier on communication by triggering the negative reactions to all immigrants.

One example of such paradoxical behavior came from a Cuban interviewee of this research, who was angry and bewildered as she mentioned that her sister living in Miami –a Cuban immigrant living in the U.S.A. herself– supported the current anti-immigrant attitude of the U.S. government. Such cultivation of "a mean world" and "others as opposed to us," build subjectivities that deepen the processes of alienation. Herbert Marcuse had defined reification and alienation as the "individual [losing] the power of comprehending and transforming subjectivity as it becomes dominated by alien powers and objects". When one loses one's potential of self-determination and individuality, he/she is alienated from the powers of being-a-self, and becomes a "one-dimensional man" that had lost his/her free and creative subjectivity (Marcuse, 1964, p. xxix).

Design mode means the outcome of combining three human gifts: critical sense (the ability to look at the state of things and recognize what cannot, or should not be, acceptable), creativity (the ability to imagine something that does not yet exist), and practical sense (the ability to recognize feasible ways of getting things to happen). Integrating the three makes it possible to imagine something that is not there, but which could be if appropriate actions were taken (Manzini, p. 27). Modern media's elitist role in the society has long been redundant, nevertheless, social media has the potential to cultivate, educate and persuade audiences towards a better understanding: Getting people to see themselves and their place in the world in a different way. Maybe design would help tackle such a complex problem, if we would try to redefine the problem, by tackling its constituent parts. A different subjectivity as Marcuse suggests, getting people to see in a different light, getting them to see themselves and their place in the world in a different way would help. Then, the cultural adaptation problem of immigrants, re-constructed as a design problem would become this: How can we use this opportunity of diversification, to create a more resilient society?

The Persona Method and Developing the Persona Hypothesis

Human beings develop, survive and are confirmed within their webs of interaction and communication. Such a range of relationships, "relationship web," suggests the extensions of man, through which needs are communicated, ideas, values and assumptions are expressed (Baker, 1990, p. 64). This process, which constructs the identity of the person, also serves to

construct the person as a social being in the public space. Inextricably rooted in the original culture of a person, communication is a dialogue that occurs between the person, significant others and the environment, developing at verbal, behavioral and affective levels (Watzlawick, Beavin & Jackson, 1967). When a person migrates to a new country, not only the culture that surrounds him/her changes, but also the relationship web is torn, and the person is left without his/her social references. This new experience requires perseverance in trying to build a new web and resilience in balancing one's identity with the requirements of the new culture.

At the core of the design thinking process, is the deep interest in developing an understanding of the people for whom we are designing the products or services. Hence, with the advance of design thinking, designers stopped *assuming* the needs of the users and focused on investigating their *actual* experiences to meet their requirements. When applied to the enormous problem of cultural adaptation, what we have learned from artists and designers is important on two basic points. Firstly, if our aim is to create diversified, resilient societies, then we should make cultural adaptation a priority and find solutions that do not assimilate any of the cultures involved. Hence design solutions have to go beyond power struggles in interactions between different cultures. Secondly, we can follow the examples of the artists that have long found ways of leaving their original culture behind, going to a new country, new culture but keeping their identities intact and resilient, while integrating themselves to the society.

According to the Interaction Design Foundation's Encyclopedia of Human Computer Interaction, persona is a description of a fictitious person (Soegaard & Dam, 2014, p. 2039), and the benefits of using the persona method in design range from increasing the focus on users and their needs to having direct design influence and leading to better design decisions (Cooper, 1999; Cooper et al, 2007; Nielsen, 2014). Introduced by Alan Cooper, in *The Inmates are Running the Asylum* (1999), a persona is different from an archetype or a person in its metonymic qualities, as we do not consider the entire person, but instead, "highlight the relevant attitudes and the specific context associated with the area of work" (Soegaard & Dam, 2014, p. 3040). In today's design world, four different persona methods are being used (Nielsen, 2014, p. 2044), yet, this research mainly follows Cooper's goal-directed design approach to develop a persona, agreeing that the persona descriptions should be founded on data and trying to identify the needs and goals of the displaced artists and designers. Adapting to a new culture requires a significant change in the behavior of the person and the persona method gives us a very nice framework to analyze the current behavior of a "user" and to find the basis for designing and suggesting a new behavior. Hence the main objective in applying the persona methodology and developing an artistic migrant persona is to identify the contextual needs and goals of such a person in the defined circumstances.

This research, as it does not focus on a specific case of migration, but instead on the behavior of adaptation, has selected the artists, designers, architects as the main group of interviewees, from many cities that were included as project partners and a minimum sample of 15 people were interviewed in each of the project destinations to develop this persona as universally as possible. The persona hypothesis was based on likely behavior patterns in cultural

adaptation and the factors that differentiate these patterns, instead of demographics (Cooper et al, 2007, p. 60).

The persona hypothesis was developed based on the history of art and design, which gives us numerous examples of artists and designers, that have left their countries of origin to work and thrive in other cultures. Many of such artists have proven to be good at communicating with people from different cultures and they have adapted well, but did not lose their own identities in the process. They have not been assimilated, but instead have contributed and enriched the cultures where they have settled. While this was the hypothesis for developing the persona, the overall hypothesis of the research was that this process of adaptation would be quite relevant to the context of the displaced and that the artistic migrant persona would be a useful agent for social change, even a “pilot subgroup” if we may call it that, / for triggering the adaptation of the rest of the displaced population.

Thus the interview was structured accordingly, ranging from the use of different communication mediums to the definitions of concepts like empathy, communication, misunderstanding, friendship, solidarity, alienation, integration, others and home, with the objectives of covering concerns like:

1. What different personal qualities/cultural values gain significance in the preliminary interactions between people from different countries/cultures.
2. What ranges of behavior and sets of values need to be explored.
3. What are the *touchpoints* that create cultural conflicts.
4. What kinds of misunderstandings arise and how are they dealt with.
5. How migrants construct a sense of “home” and “belonging”.

This paper presents just a preliminary glimpse on to the data gathered; nevertheless, the research will mature, when all the cities and interviews are completed. The findings will eventually be brought together to highlight the significant features of a semi-fictional, artistic migrant persona that could contribute as an agent of change in processes of cultural adaptation.



Figure 2. Erkan Özgen, Wonderland (2016). Watching the trauma of a little Syrian boy, video exhibition at the 15th Istanbul Biennial. <https://bit.ly/2ElvvQy>.

The Preliminary Findings of the Artistic Migrant Persona Research: Mapping the Users

Even though the research is still in progress, and it will take at least two more years to conclude it, through the interviews carried out in Paris, Izmir and Havana, some preliminary paths have started to emerge. These paths indicate indeed, the presence of some shared values that may eventually fulfill the persona hypothesis. In this section a brief overview of the findings will be given, without a claim at academic accuracy of the results, just to indicate the shape that the research is taking.

According to the persona construction process developed by Robert Reimann, Kim Goodwin, and Lane Halley, "creating believable and useful personas requires an equal measure of detailed analysis and creative synthesis" (Cooper, 2007, p. 97). Looking at the data from forty-three interviews that were realized between July 2018–January 2019, the behavioral variables below were defined. They should serve as the criteria to map the participants and to identify the significant behavior patterns in the following phases.

1. The capacity to empathize with others (from empathic to indifferent)
2. The role of personal similarities/differences in intercultural communication (from self-sameness to mismatch)
3. The level of attachment to root cultural values (from high/resilient to low/adaptable)
4. The level of adaptability (from open-minded/flexible to rigid)
5. The duration of learning languages/culture-specific meanings (from long to short)

6. The frequency of misunderstandings (from common to infrequent)
7. The level of tolerance for strangers (from high/open-minded to low/intolerant)
8. The level of religious faith (from high to low)

Certainly there are too many variables and contexts that can affect the behavior patterns that are roughly defined, but the idea is to look for the patterns and attitudes themselves, instead of considering how they change with age, gender or ethnicity. Hence in the interviews that were carried out, the demographics were not limited to a certain group, so the ages of the participants ranged from 15- to 75-years old, with interviewees ranging from Cubans that have migrated to Denmark, to Kurdish that have migrated to France.



Figure 3. "Home". By Servet Cihangiroğlu (2018).

One of the starting points of this research was to figure out what kind of a persona is open to communication, and actually does facilitate communication in an intercultural setting, based on the experiences of the artistic milieu of the society. The participants were selected from the "creative classes" of their respective societies, and the decision to develop an artistic migrant persona was a deliberate choice, as historically this group has proven to be the one that is most open-minded and open to communication.

Some of the significant concepts that attracted attention as of February 2019 were open-mindedness, generosity and common grounds. Some interesting definitions of empathy, the development of relationships and the concept of home were provided by the participants. It is also important to note that almost the whole sample was very willing to dedicate time and energy to fix

misunderstandings and they mostly felt that it is very important for a human being to express her/himself clearly and accurately. In almost 90% of the cases, intercultural communication takes place in a second foreign language for everybody involved. Hence it requires a bigger effort for everyone to express oneself and to understand the other as all participants have mentioned, "lacking the right words" or "not having the exact words". As charmingly expressed by an Italian designer living in Izmir, for one to understand people from other cultures, "it's not languages, but concepts that have to match" (December, 2018).

Another curious point that frequently surfaced in the interviews was that these creative people found it very difficult to identify anyone as an "other". "Other" is a term used to refer to a person that is different or distinct from one's self and from those one knows about. The Lithuanian-born French philosopher Emmanuel Lévinas famously stated that the self, in both a psychological and a philosophical sense, is only possible through the recognition of the Other. While it has been commonly used to highlight a negative reaction between Europeans and Anglo-Americans from those they have dominated, it can also reference the potential for positive encounters between self and Other, between peoples of different races, classes, and religions.

Frequently coupled with an agnostic perspective on religion, this reluctance to alienate or categorize people, confirmed the open-mindedness that is expected –if not demanded– of the creative classes of the society. Indeed, questions concerning the role of personal similarities/differences in intercultural communication, showed almost no inclination towards self-sameness: Most of the people interviewed were not only open to knowing people that were different, but even more curious to do so. Instead of rejecting or alienating diversity, they tend to be attracted when someone is different or can bring novelties to their lives.

An aforementioned research carried out by Van Lange et al (2002) highlights the significance of generosity, instead of reciprocity in cases of intercultural communication. Hence one very significant characteristic of the artistic migrant persona can be identified as generosity, in terms of time and energy and open-mindedness that allows for a better understanding of the other party involved. Open-mindedness in such context also allows for misunderstandings to be resolved without further complications, thereby reducing the detrimental effects of noise in communication. Moreover, some of the participants considered misunderstandings as actually providing the opportunity and the potential to improve interpersonal communication, as they were considered as "gateways to clarify, elaborate and develop deeper interpersonal dialogue" by a Kurdish participant of this research (July, 2018).

An elaboration by a Uruguayan dancer, who has been living in Paris for almost fifty years, serves well to summarize and conclude these preliminary findings:

"For me, religion is the first misunderstanding of all humanity. The first and the biggest. It is the manipulation of power; it takes power off of people. I am very sure of this. I'm not sure of many things, but I'm really sure about this. In my adaptation processes in Paris, one of the things that had impacted me most was the arrogance of people. For example, I have a friend, who doesn't let me finish my sentences. He always interrupts me and says something

before he could have the patience to understand what I wanted to say in the first place. This is just one of the misunderstandings that is provoked by the arrogance of people. Because they don't have the patience to really understand, instead of reaching an understanding, we have misunderstandings. I don't think we have an objective way of seeing things. We don't distance ourselves from the problems, we have to let ourselves look at problems from a distance and without the negative impact of politicians."

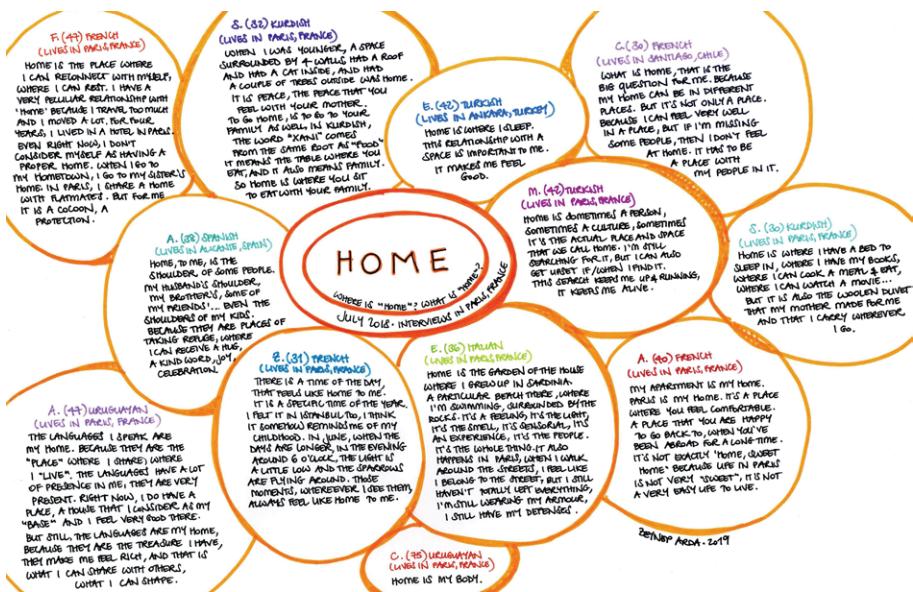


Figure 4. Work in progress. A schema to compare the definitions of "home" deducted from the interviews in Paris, France in July-August, 2018. Zeynep Arda (2019).

Conclusion

"As Marguerite Yourcenar says in *Memoirs of Hadrian*, the country that you belong to is the first one where you first become conscious of yourself as yourself."

– An Italian architect living in İzmir

This ongoing research is an attempt to develop an artistic migrant persona that would serve to help in the process of cultural adaptation or placemaking for the people that have left their hometowns behind. One of the definitions of placemaking is "the way in which all human beings transform the places they find themselves in to the places where they live" (Schneekloth & Shibley, 1995), however according to Ezio Manzini, "since communication is no longer hindered by distance", space is no longer endowed with sense through the meaning it acquires from the conversations about it, or in other words the significance that emerges from communication, hence there is no such thing as placemaking anymore (2015, p. 189).

Nevertheless, leaving a place behind, leaving your original culture behind and going through long processes of cultural adaptation and trying to feel at home in a new culture is a struggle that many people are facing on a daily basis. This may require a new meaning of placemaking, one that can be elaborated with the artistic migrant persona: Placemaking is no longer about an actual place, as due its original definition of the concept in city planning. It is the design of an experience that facilitates relating to a new culture.

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Professional Papers

Designing a Dissemination Framework: An Introduction to Design Knowledge Transfer

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Abstract

The Design Research Lab (DRLab) at the University of Trento is a research centre engaged in design knowledge transfer for the educational, production, and public policy systems in Trentino. Theoretically supported by the field of study of design research, DRLab follows a ‘Research Through Design’ approach with the aim of encouraging design-led approaches to innovation in public and private organisations. Therefore, this paper reports on how DRLab designed, performed field experiments through service design, and evaluated and iterated a framework for the dissemination of design culture in contexts where design is not systematically adopted. As results, this paper presents the DRLab Dissemination Framework as an action-led research framework for a setting-up phase in a wider design knowledge transfer process. The three main cores of the framework are (i) discourses; (ii) publications; (iii) formats. ‘Discourses’ are seminars, workshops and project presentations that have the aim of disseminating the theoretical and practical aspects of design. ‘Publications’ are all the media that aim to communicate the design contents and results, research works, and theoretical aspects of all the different subjects with different expertise levels. ‘Formats’ are practice-based design formats with specific design tools and design processes; and their aim is to engage local actors to apply design knowledge via a learning-by-doing approach. Also, the paper reports qualitative and quantitative feedback in terms of impact factors related to the level of interest in design-led approaches and in service design after experimenting with these practices in real design contexts.

Author keywords

Service Design; Design Knowledge Transfer; Public Policies; Complexity

Introduction

The Design Research Lab (DRLab) at the University of Trento (Italy) is a research centre that since 2017 has dedicated itself to the mission of facilitating the transfer and application of design knowledge to the educational, production, and public policy systems in Trentino.

The research centre is funded by the autonomous Province of Trento with the aim of supporting public and private entities and associations of the province in transitioning from a product-based economy to a service and knowledge-based economy. DRLab is the result of a combined initiative of the University of Trento, Confindustria Trento, the Bruno Kessler Foundation (FBK), and the Pavoniano Artigianelli Institute.

Theoretically supported by the design research field of study (Archer, 1981; Findeli, Brouillet, Martin, Moineau, & Tarrago, 2008; Findeli, 2010; Jonas, 2014; Manzini, 2015), DRLab follows the Research Through Design (RTD) approach (Frayling, 1993; Jonas, 2007; Findeli et al., 2008; Zimmerman, Stolterman, & Forlizzi, 2010; Godin & Zahedi, 2014; Manzini, 2015; Reeker, van Langen, & Brazier, 2016) with the aim of encouraging design-led approaches to innovation in public and private organisations and supporting them in “advancing its very own design practices by exploring alternative design approaches and by developing a design attitude” (Junginger, 2015).

According to the authors of this paper, supporting this process in favour of the growing of autonomous local entities in design is one of the short term objectives of the DRLab for preparing the local educational, production and public policies systems to respond, as complex local systems “to adverse influences in order to survive or thrive” (Taysom & Crilly, 2018). Furthermore, by transferring design knowledge from the University to these local entities in favour of the development of a local design discourse is one of the fundamental steps for supporting resilience in a local perspective and therefore for supporting the ability of the mentioned systems “to absorb changes of state variables, driving variables, and parameters” (Holling, 1973).

Methodological approach

DRLab built up a research framework divided in three consequential research phases (Figure 1); (i) Setting-up; (ii) Experimenting; (iii) Modelling. This paper describes the ‘Setting-up’ phase which has the objective of encouraging the usage of service design as a human-centred approach for design. This phase focuses on disseminating design culture, practises, and approaches to be applied in contexts where service design is not systematically adopted. The expected outcomes for this first research step are related to an increase in the interest in service design among local entities.

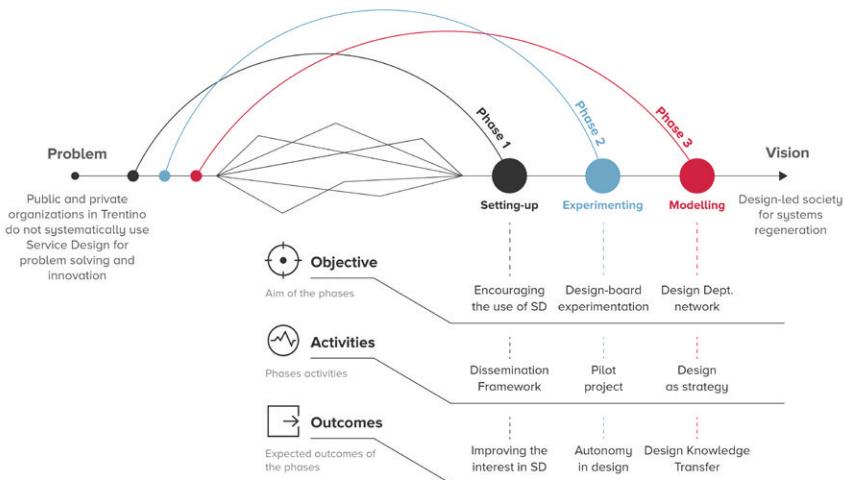


Figure 1. Objectives, activities and expected outcomes of the DRLab research phases.

The setting-up research phase

Following an action-based research process, DRLab organised activities both in-field and in the laboratory according to the following four phases (Figure 2):

- Engaging
- Analysing
- Applying
- Evaluating

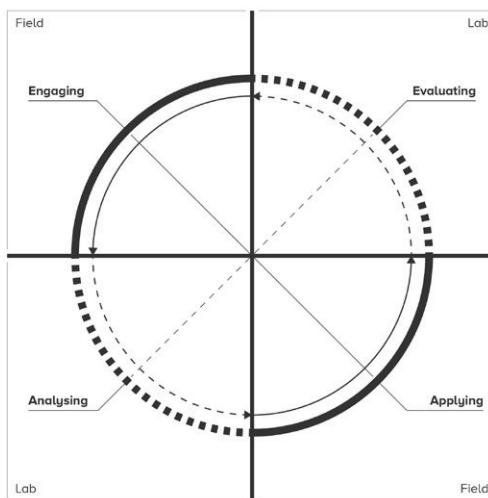


Figure 2. The DRLab action model.

Engaging

Initially, DRLab spent time and resources in promoting service design at a local level. The aims were (i) engaging potential stakeholders; (ii) collecting interests for design partnerships from public and private entities; (iii) understanding opportunities and the needs of potential stakeholders; (iv) acquiring human resources engaged in multiple aspects of design such as designers, design researchers, and researchers.

Analysing

Successively, DRLab started an intense programme of analysis assuming design research as its main theoretical foundation and RTD as the main approach for building a design-led set of actions. Service design was definitively adopted as the main design discipline for the dissemination of design culture. At the same time, a set of design processes, design tools, and formats were selected and optimised with the aim of building a practice framework for the design activities to be held with the local stakeholders as design partners.

Inclusive and participatory approaches were preferred for structuring the framework with the aim of (i) promoting participatory design and involving stakeholders as much as possible; (ii) optimising the resources (e.g. design tools) for stakeholders not trained in design; (iii) organising co-design sessions with heterogeneous groups of stakeholders. According to the needs and the opportunities expressed by the local entities, the resulting design formats are methodologically rooted in the praxis of the design workshop (Hanington & Martin, 2012; Miettinen, 2009).

In addition, DRLab has designed events such as seminars, theoretical workshops, and project presentations with the aim of reaching a local audience. A series of seminars were organised inviting different kind of speakers from different background with the purpose of focusing on topics that in different ways are related to design and design research. Additionally, intensive workshops were planned with the aim of describing how designers work at a professional level.

Applying

The analysed contents were implemented in-field according to the following main set of actions:

- Seminars
- Workshops
- Design Experiences (DXs)

DRLab organised seven theoretical seminars in collaboration with national and international speakers about different topics such as innovation, architecture, design sciences, design research, service design, aesthetics, semiotics, philosophy of design, and interdisciplinary research. The seminars were

completely open and free, and captured the attention of experts, teachers, students, and professionals.

Furthermore, DRLab organized four intensive open and free workshops (between four and eight hours per session) with the aim of introducing and adapting the practise of specific skills in the field of design about data visualization, communication, design thinking, service design, and storytelling. To this aim, both professionals and researchers in design conducted activities with groups of between ten and twenty participants per session among local professionals engaged in different disciplines.

In parallel, a set of DXs were organized with five local design partners. DRLab adopted a learning-by-doing approach for (i) formulating shared design questions, (ii) transferring a basic introduction of design knowledge, (iii) doing basic collaborative and human-centred DXs through structured design phases and optimized design tools.

The following design phases based on the Double Diamond (Design Council, 2007a; 2007b) were identified for the DXs:

- Exploring
- Defining
- Ideating
- Testing

With the five design partners DRLab organised twenty design workshops (including pre-meetings) and two design ethnography (Hanington & Martin, 2012) sessions (i.e. semi-structured interviews; card sorting), leading to a total amount of 145 hours of collaborative design-based activities in nine months and with three internal resources¹. See Figures 3 and 4 for details about the DXs such as the kind of collaborative activities (co-activities), the process phases, the used tools, the collaborative hours (H), and the number of the involved people (PPL).

¹ They have different backgrounds such as philosophy, design research, service design.

DX1 DESIGN PARTNER:
A local ICT company engaged in innovative Information Technologies

Typology:
Private entity

DX1 SYSTEM:
Production system

DX1 ACTORS:
Company employers; CEO and managers; potential users

CO-ACTIVITIES	PROCESS PHASES	USED TOOLS	H	PPL
n. 1 Pre-meeting	/	Brainstorming	4	4
n. 3 Design Workshop	Defining Ideating Testing	Insight Matrix; Personas; VIP Map; User Journey Map; How Might We; Dynamic Personas Ideation; Innovation Sweet Spot	12	8

DX2 DESIGN PARTNER:
A not-for-profit local association engaged in the valorization of the territory

Typology:
Public entity

DX2 SYSTEM:
Public policies system

DX2 ACTORS:
Citizens; public admin. representatives; botanists; mentors; pro loco volunteers

CO-ACTIVITIES	PROCESS PHASES	USED TOOLS	H	PPL
n. 1 Design Workshop	Exploring Defining	Personas; VIP Map	8	6

DX3 DESIGN PARTNER:
A provincial institute for research and educational experimentation

Typology:
Public entity

DX3 SYSTEM:
Public policies system

DX3 ACTORS:
Teachers; students; parents; school directors; representatives of the institute, the Employers' Association and the Department of Education and Culture of the Province of Trento

CO-ACTIVITIES	PROCESS PHASES	USED TOOLS	H	PPL
n.1 Pre-meeting	/	/	4	1
n. 2 Design Workshop	Defining Ideating	Insight Matrix; Personas; VIP Map; User Journey Map; How Might We; Design Scenario	8	20
n. 1 Design Seminar (design workshop)	Defining Ideating	Personas; User Journey Map	4	16

Figure 3. Details of the DX1, DX2 and DX3.

DX4 DESIGN PARTNER: A technical/technological educational institute (high school) in Trento	DX4 SYSTEM: Educational system			
Typology: Public entity	DX4 ACTORS: Teachers; students; administratives (ATA); parents; school directors; representatives of IPRASE, the Employers' Association and the Department of Education and Culture of the Province of Trento; companies employers			
CO-ACTIVITIES	PROCESS PHASES	USED TOOLS	H	PPL
n. 2 Pre-meeting	/	Brainstorming Problem Tree Design Brief	8	7
Design Ethnography	Exploring	Semi-structured interviews; Card Sorting	35	39
n. 3 Design Workshop	Defining Ideating Testing	Insight Matrix; Personas; Stakeholders Map; User Journey Map; Problem Tree; Ideation Board	12	14
DX5 DESIGN PARTNER: A trade association engaged in the food system of the Province of Trento	DX5 SYSTEM: Production system			
Typology: Private entity	DX5 ACTORS: Bakers; consumers; sales personnel; representatives of the Italian General Confederation of Enterprises in Trentino (Confcommercio); experts in cereals foods and in bakery supply chain			
CO-ACTIVITIES	PROCESS PHASES	USED TOOLS	H	PPL
n. 2 Pre-meeting	/	Brainstorming Design Brief	8	6
Design Ethnography	Exploring	Semi-structured interviews; Card Sorting	26	29
n. 4 Design Workshop	Defining Ideating Testing	Insight Matrix; Personas; Problem Tree; Ideation Board; Service Blueprint; SWOT Analysis	16	12

Figure 4. Details of the DX4 and DX5.

For each DX a Co-design Team was formed with a minimum of six to a maximum of twenty people from among those making up the design partner system. Also, for longer DXs a team of Collaborative Project Managers (between four and eight people from amongst the design partners) was formed with the aim to co-design with DRLab team the early phases of the DXs. Every single experience was organised as a simulation of a design process - or a part of it - applied to real problems and needs as well as designing for the opportunities of the engaged stakeholders. However, all the DXs were realised with the objective of disseminating basic design knowledge, without the ambition of either problem solving or implementing design solutions.



Figure 5. Two of the four groups of participants during the Design Seminar in the DX3.



Figure 6. Semi-structured interviews during the Design Ethnography sessions for the DX4 (left) and the DX5 (right).



Figure 7. Participants during a design workshop for the DX4 (left) and the DX5 (right).

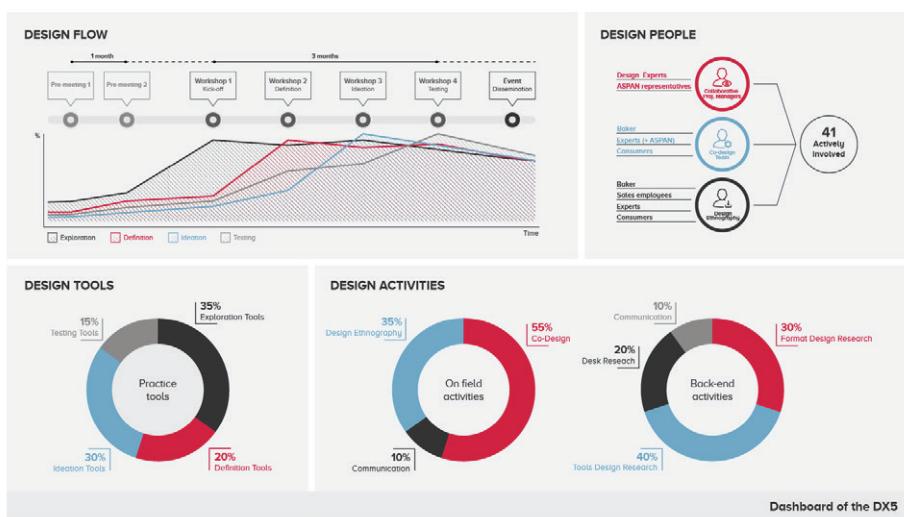
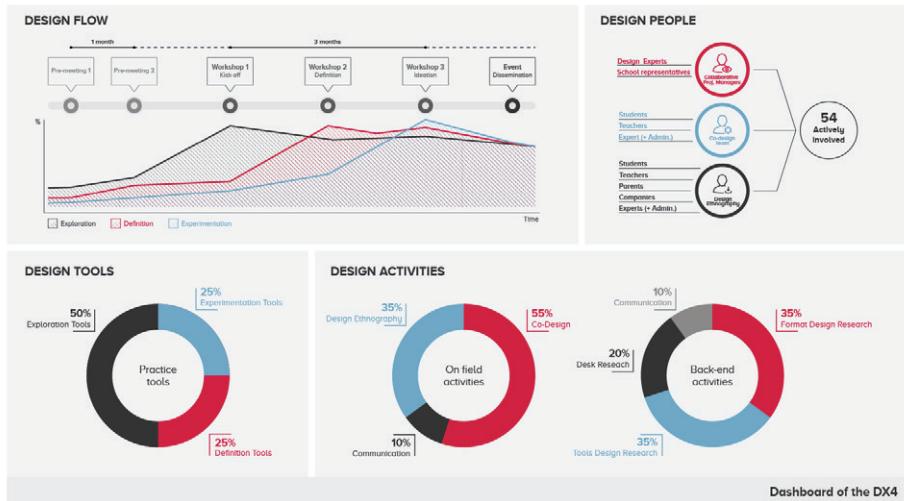


Figure 8. Design activity dashboards for DX4 and DX5.

Evaluating: discourses and publications area

The seven design seminars and the four practical workshops were evaluated through data gathered in loco after each activity. There captured participant feedback and comments in a qualitative, informal, and unobtrusive manner according to their general satisfaction and levels of interest about the relevant activities.

Also, DRLab is producing technical reports and academic contributions related to the activities carried out in-field. However, publication output and the DRLab website content are actually still in the production phase and still under evaluation.

Evaluating: formats area

DRLab mainly adopted qualitative techniques for evaluating the DXs with the design partners in the field. Data was collected after the DXs by focus groups (around 45 minutes per session), semi-structured interviews (around 45 minutes per session), and an anonymous questionnaire involving the Co-design Teams after the DX4 and DX5 based on the longest and most structured design format applied in two different contexts.

The participants were involved with the aim of understanding if they had developed an interest in service design due to the activities and the support provided by the DRLab. Specifically, through the focus groups and the semi-structured interviews DRLab collected more than six hours of material investigating (i) participants moods and emotions; (ii) what they would remove, change, or add; (iii) their autonomy in studying and using service design; (iv) a general impact in their daily activities.

Through the anonymous questionnaire, DRLab investigated what kind of formats participants preferred (i.e. meetings; events; consultings; project reviews; design studios; partnerships) and how they would like to apply them for their future problems and needs in designing.

Results

The main result is related to the identification of the “DRLab Dissemination Framework” which is the result of the collaborative activities carried out on field *with*, and *for* the differently engaged stakeholders of the educational, production, and public policies systems. Accordingly, DRLab identified three main cores of the framework which are (i) discourses; (ii) publications; (iii) formats. Every area of this framework has specific outputs as shown in Figure 9.

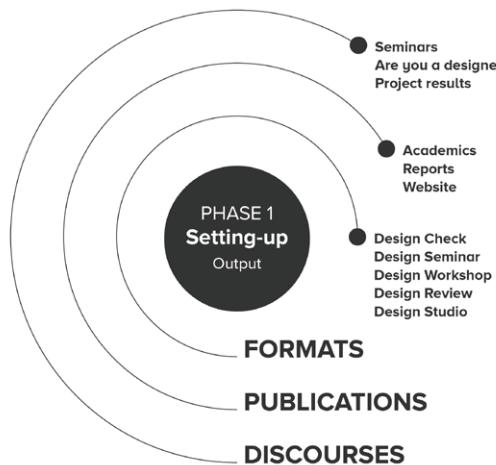


Figure 9. Outputs of the DRLab Dissemination Framework in the setting-up research phase.

In less than one year, DRLab actively involved more than 150 people in collaborative design-based activities and provided more than fifty activities among the three areas of the Dissemination Framework.

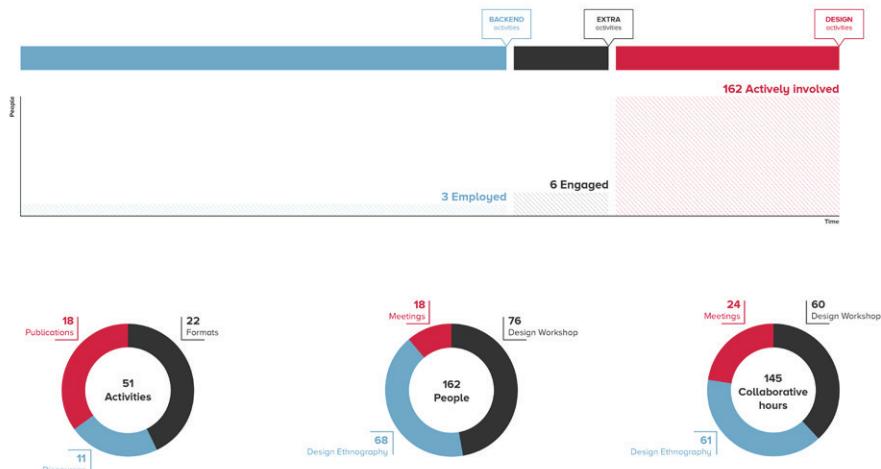


Figure 10. Overview of the DRLab activities.

Results: discourses

'Discourses' are seminars, workshops (named "Are you a designer?"), and project presentations with the shared aim of disseminating the theoretical and practical aspects of design in order to create and maintain an open 'local design discourse' where the design research acts *for* and *with* local agents.

Discourses area evaluation

The seminars were frequented by an average number of forty participants and the workshops had an average of fifteen participants. Through feedback and comments they expressed a general satisfaction mainly because they were taking part of a free and open education about innovative topics provided by the local University. Three patterns were identified about the impact of these activities:

- Participants that did not understand all the topics were surprised and they want to remain informed about similar future initiatives.
- Participants that understood almost all the topics want to apply what they learned and they want more of such initiatives.
- Participants that understood the topics and the transferrable value for their organisations proposed to the DRLab some kind of future partnership or requested more structured and open educational opportunities (e.g. a master course in service design).

Furthermore, participant interest in being informed is confirmed by the newsletters and the DRLab website trends. DRLab has actually 334 confirmed contacts in the mailing list and after 5 newsletters the 94% confirmed to be subscribed with an average of the 64.55% of opening. In addition the "events" page (in Italian language) is actually the second most visited page on the website².

Results: publications

'Publications' are all the media (i.e. academic publications, technical reports, website contents) that have the aim of communicating the design contents and results, research works, and theoretical aspects of all the different subjects at different levels of expertise. In addition to the website, DRLab produced sixteen technical reports and two final reports about the DX4 and DX5. Conference papers and annual books are under construction.

Results: design formats

'Formats' are participative design formats that have the aim of engaging local agents to apply basic human-centred design knowledge with learning-by-doing approaches. According to an inductive process, the Analytical and Applying Phases allowed the identification of five design formats (Figure 11) and thirty-two optimised design tools to be used in collaborative activities such as the following design formats. All the tools were optimised with the aim of conducting co-design activities with people not trained in design and four of these design tools were ideated and designed by the DRLab team.

² Data of January 2019 that are not affected by any promotional actions because DRLab has actually not social network or promotional plans for persuading users in visiting the website.

The fundamental features of the identified design formats in the Dissemination Framework are shown below.

Design Check

This format is developed in a minimum of eight collaborative hours in one session. A maximum of three design tools can be used with ten participants. The objective of this design format is to identify representatives in a group of different stakeholders in order to create future collaboration and/or partnerships with other design formats.

Design Seminar

This format is developed in a minimum of four collaborative hours in one session. A maximum of two design tools can be used with thirty participants. The objective of this design format is engaging decision makers and representatives in a wide group of different stakeholders in order to create collaborative groups in a system.

Design Workshop

This format is developed in a minimum of eight collaborative hours in two sessions. A maximum of six design tools can be used with twenty participants. The objective of this design format is identifying the responsible collaborative groups for applying other formats or starting a longer project.

Design Review

This format is developed in a minimum of sixteen collaborative hours in four sessions. A maximum of eight design tools can be used with fifteen participants. The objective of this design format is identifying and defining the basic elements for a potential DX on a specific object. This format allows the simulation of a design process with four phases and data analysis processes are required for the participant's teams during the main co-design sessions.

Design Studio

This format is developed in a minimum of thirty six collaborative hours. A maximum of twelve design tools can be used with twenty participants. The objective of this design format is exploring the design contexts with real data and a setting simulation in order to understand real problems and opportunities as well as stakeholder needs. Processes of data analysis are required on the participant's teams among the main co-design sessions. Also, this format assumes an explorative value through service design and it is useful for identifying the necessary information for completing a Logical Framework (Sartorius, 1991; European Commission, 2004; United States Agency for International Development, 2012) and developing new projects.

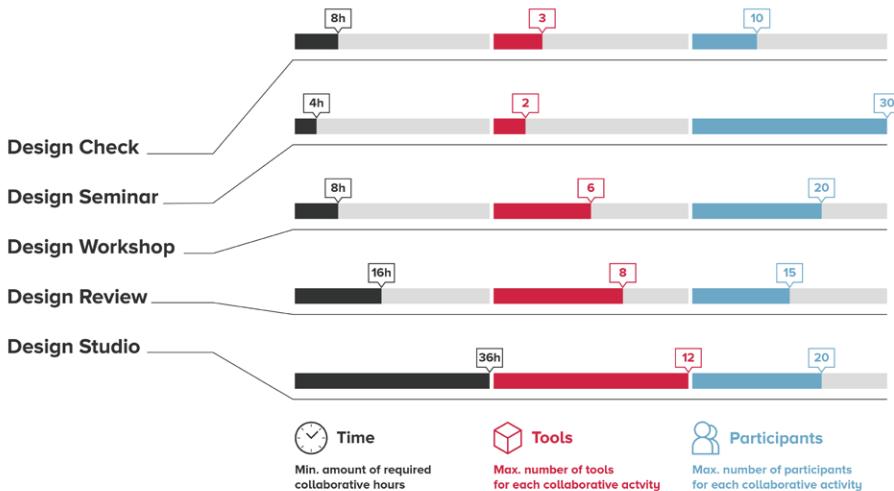


Figure 11. DRLab Dissemination Framework: Design Formats.

Results: design results

Each DX allowed the design partners and the stakeholders to envision new ideas and innovative design concepts, as well as reconsider problems and envision opportunities.

Design results: DX1

The DX1 assisted the participants in starting an iterative process about the service they were designing. They realised that without assuming a human-centred approach, they were not focusing on the right problems. As mid-term impacts, they started to consider a basic design ethnography approach in their ordinary design process for optimising the solutions, gaining public funding, and developing the service.

Design results: DX2

The DX2 assisted participants in considering the product-service they were designing as a part or an output of a systemic project. Therefore, with deeper reflection on the different kinds of stakeholders, their problems, needs and interactions, they started to assume a multi-stakeholder approach focusing on interrelations and thinking of their ideas as the collaborative output of a complex system.

Design results: DX3

The Design encounters for the school-work alternation project (DX3) assisted the participants in sharing problems and focusing on opportunities for the first time in a design-based collaborative way. Furthermore, the participants

envisioned a few ideas and opportunities to be implemented in their own contexts according to specific needs. In term of short-term impact, the encounters created the condition for the DX4 in collaboration with a secondary school institute of the city of Trento.

Design results: DX4

The DX4 allowed the participants to experiment with service design and real data gathered in-field (through Design Ethnography) about problems and opportunities of the work-school alteration project in the context of a high school of the city of Trento. As results the participants obtained three co-designed concepts.

The first is a design concept for a collaborative training process for teachers that are not so confident with the principles of the work-school alteration project. The concept is based on the simulation of collaborative experiences by a learning-by-doing approach.

The second concept was designed with the aim of reinforcing the role of teachers who are actually the most active in planning the work-school alteration projects through national and international experiences on field (i.e. companies and research centres).

The third concept defines the details of an upside-down teaching and training model addressed to students that are unmotivated by the principles of the work-school alteration project. According to this concept, students are invited to collaborate on investigating aspects they would like to develop as their shared project.

As short-term impacts of the DX4, the participants had a clearer comprehension of their stakeholder's problems and needs with a focus on the agents they should involve because considered 'excluded' during the work-school alteration projects design.

Design results: DX5

The DX5 assisted the participants in taking a clearer picture of what kind of problems they were facing from a systemic and service perspective. They understood the urgency for their companies in finding a collaborative way to solve common problems in the local food supply chain and they identified opportunities through three co-designed concepts.

The first concept is about a professional school (based on field education) to be "food-managers" for supporting zero kilometre local foods system.

The second concept is a business-to-business service that allows to bakery supply actors in monitoring the quality of the chain, tracking raw material, and certifying zero kilometre foods with a new and more stringent system.

The third is a co-designed concept of an annual event in the bakery innovation systems. In this case, the event is a strong touchpoint set for the networking

and sharing of innovations in the bakery system and all the stakeholders are invited in doing research and development to be part of an innovation trend.

As an evident and declared impact of this DX some of Trentino's small and medium companies collaborated with the service design discipline process and tools with the aim of reaching a common and shared objective despite strongly being competitors in the same market of a small Province.

Design formats impact

Focus groups and semi-structured interviews with the Co-design Teams of the DX4 and DX5 allowed the collection of feedback, comments, and impact data about the activities.

The inquired aspects highlighted the following topics.

Moods and emotions

The most used terms to describe the DXs by the participants were 'liberating', 'entralling', 'equal', 'neutral', 'reflective', 'enjoyable', 'challenging', 'exciting', and 'provocative'. Almost all the participants for both the DXs highlighted that they felt a comfortable, neutral, and equal context despite collaborating with often antithetical colleagues (DX4) or market competitors (DX5).

Removing, editing, adding

Almost all the participants were demonstrably interested and intrigued by the service design approach; they requested more theoretical contents (e.g. 'simplified' manuals) - especially about the design process and techniques for analysing and synthesising data gathered in-field during the exploration phase. They also required a simplified usage of a few terms that generally are not translated from the English language. Indeed, they felt not comfortable with terms such as 'insights', 'stakeholders', 'service design', 'blueprint', 'brainstorming' - just to name a few that they would prefer to be translated in Italian language. At the same time, a few participants would have spent more time in developing the concepts with more tangible results. This is symptomatic about the difficulties that a few had in understanding the whole value of a completed design tool (e.g. a Service Blueprint or an Ideation Board) as a tangible medium of the design result. Some participants highlighted the needs in building a more heterogeneous co-design team with more representative stakeholders. Similar affirmations confirmed that they better understood through the DX the importance in systematically structuring and adopting a collaborative and structured approach for facing problems. Finally, a few participants highlighted the importance in extending this kind of DX as soon as possible and as much as possible into the entire system of stakeholders for doing networking in terms of facing issues from a systemic and collaborative point of view.

Autonomy

A shared feeling among the participants is that they would like to have more training before doing experiments autonomously with service design. Only a few participants declared that they autonomously searched for more information about service design. One participant bought a book about strategic design and another looked for graphs and diagrams on the Internet about the service design process after the DX. Other than another small group of participants that looked online for general information (i.e. the history, the tools, and the principles) about service design, the rests declared to be too busy to learn more about design autonomously. Almost all the participants declared to be interested in applying service design in the future for their individual contexts. Some of them declared to be able to manage a part of the process and a few tools if supported by experts. A small group tried to adopt at least one design tool (i.e. Problem Tree, Personas, Insight Matrix) autonomously in their daily activity with the aim of exploring and better understanding a specific situation and facing a problem with a more open and creative approach.

Changings

The participants did not explicitly declare significant behaviour changing in their contexts. However, at the same time, some of them declared that they had positively mentioned the DXs to other stakeholders, informing them that they are part of an innovative process, or that they are able to manage innovative approaches in their work context. Participants that generally assume strategic roles in their organizations declared that after the DX they had started to consider finding resources to implement the collaborative approach and using service design tools in a few activities of their organisations. Most of the participants would reproduce the same collaborative settings in their ordinary working contexts and for this reason a few of them started new collaboration with colleagues or ‘co-design partners’ that they met during the DXs.

The anonymous questionnaire

All the participants (except one) declared to be interested in experimenting with more activities and having more service design experiences through the DRLab Design Formats. The participants expressed comments and opinions about how they imagine a future partnership with the DRLab (as shown in Figure 12) that can be grouped in the following 6 macro-areas.

They would:

- Expand what they experienced to their daily working context.
- Reproduce the same experience with more stakeholders within their system.
- Have more DXs as a systematic training as a way of forwarding complete design knowledge acquisition.
- Use service design as a tool for problem finding and problem solving in a daily working context.
- Face big challenges in a specific context.
- Make a DX with the implementation phase.

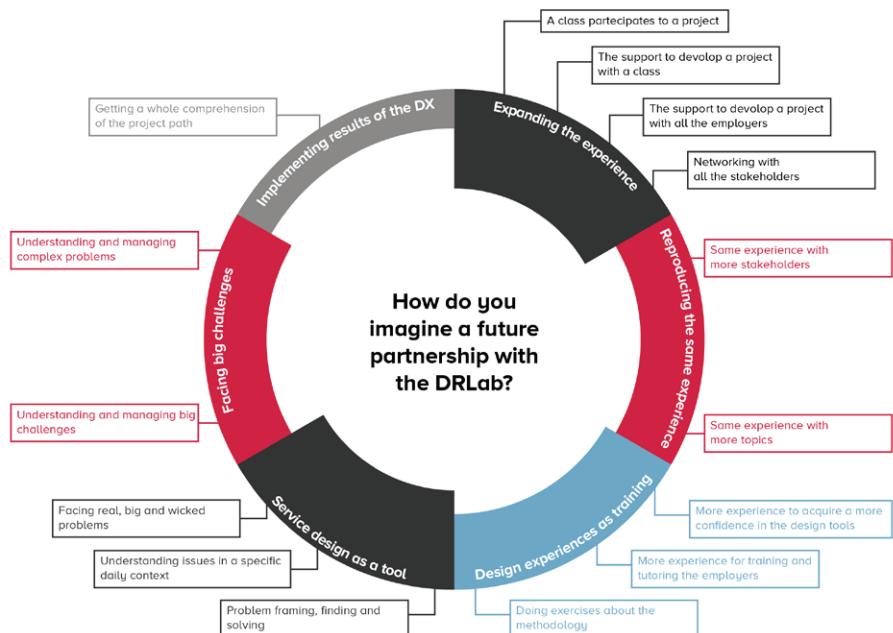


Figure 12. The macro-areas and the related details on how the participants image future collaboration with DRLab formats.

In the same questionnaire, the participants wrote what kind and how much of the DRLab formats they are interested in applying in future partnerships. These requests were transformed into “hours” in terms of the minimum quantity of collaborative hours for each design format. The result is that they requested 320% more collaborative hours in respect to the total amount of hours exploited during the firsts months of the DRLab activities (see Figure 13 for the details).

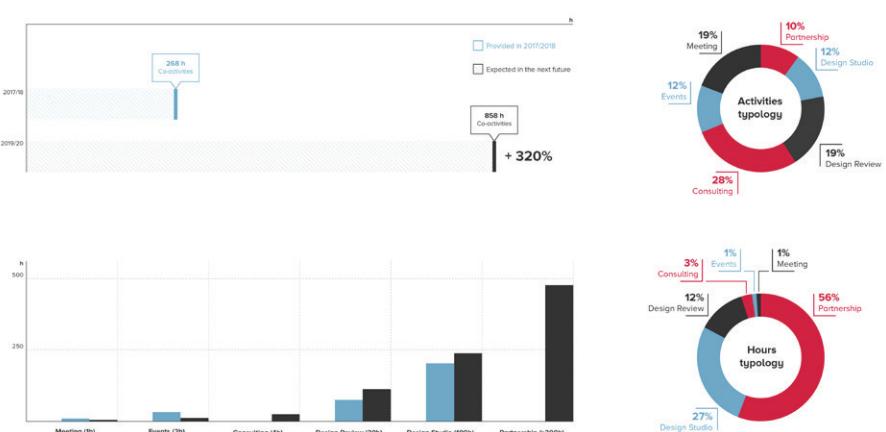


Figure 13. The DR Lab requested activities scenario.

Finally, the following are the issues that the participants suggested as the main macro-areas for applying the design formats (Figure 14):

- Improving “well-being” in a context; solving conflicts among the parts of a system and using the methodology as a collaborative tool.
- Preparing a team to address projects that are proposed by the stakeholders in a system.
- Using service design as a tool to engage partners and stakeholders in a specific system.
- Improving information transmission.
- Transforming the role of individual agents in a given context.
- Improving motivation among the agents in a given context.
- Facilitating training experiences.
- Carrying out daily problem solving.

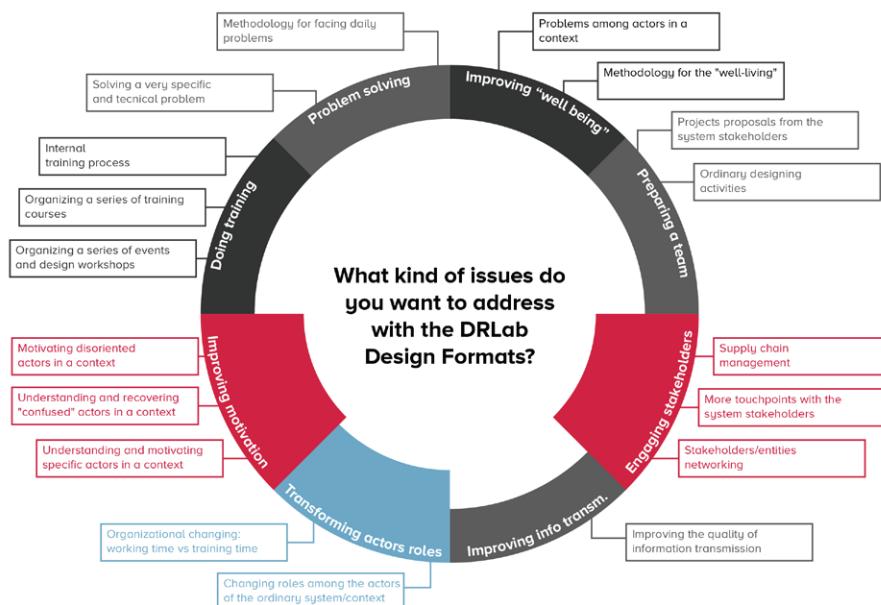


Figure 14. The macro-areas and the related details on what kind of issues the participants want address with the DRLab formats.

Conclusions

The DRLab Dissemination Framework can be actually considered a basic efficient structure for setting early activities in the case of a design knowledge transfer in contexts where service design is not systematically adopted.

'Discourses' are evaluated as a pathway to support the creation of a 'local design discourse' as open education form. However, structured and formal proposals (i.e. service design MSc or specialisation courses) should complete the offering.

'Formats' are actually the most impactful area of the DRLab Dissemination Framework, but engaging participants and applying a participative and human-centred approach are still the most difficult aspects that one should address for disseminating the service design principles through a design-led approach.

Finally, the early DRLab experience in design research suggests the adoption of research about, for, and through design in different moments of the same research process. Indeed, according to the DRLab action model (Figure 2), the first year of activities highlighted that the 'Analysing' phase was developed as a research process for design; the 'Applying' as a research process through service design; the 'Evaluating' phase as a research process about design. This was useful to organize all the different activities in a less range of time and with limited resources.

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Making resilience through design doing

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Abstract

We propose 'resilience making' in this paper as urgent, creative and adaptive action through an account of its exploration with students in the first year of an international BFA in design. We focus on the learning design being carried out for the fourth iteration of the module 'Resilience' - the last of eight modules completed by students in an introductory year structured around design tools and processes.

Our core proposition is that context-rich, place-based making is a means to connect students *within* social-ecological systems as continua, rather than positioning them as separate from the abstract concepts and systems theory we typically expect them to comprehend. Arising from this learning design process, we highlight insights around sustainability epistemologies, meaning-making in place, and our valuing of contextual and traditional knowledge.

As design practitioner-teachers, we outline our working position in relation to sustainability and resilience education, and our aims of integrating design knowing, seeing and doing. We then detail how the module will unfold with students during May 2019 - a month characterised by:

- place-specific making days progressing in focus from personal, to community, to large-scale system resilience
- structured reflection by students on their first year learning and place-based making; and

- a culminating, 'co-citizen' lab week in which students are challenged to carry out adaptive action by linking their own system and timescales in the context of their diverse learning community.

We close by questioning how we might advance 'resilience making' as design-led adaptive action, and strengthen our own resilience as practitioners and teachers of design in a time of crisis.

Author keywords

resilience making; knowing, seeing, doing; place-based; adaptive action; learning design

Introduction

We propose 'resilience making' in this paper as urgent, creative and adaptive action through an account of its exploration with students in the first year of an international BFA in design. We focus on the learning design being carried out for the fourth iteration of the module 'Resilience' - the last of eight modules completed by students in an introductory year structured around design tools and processes.

Our core proposition is that context-rich, place-based making is a means to connect students *within* social-ecological systems as continua, rather than positioning them as separate from the resilience concepts and systems theory we typically expect them to comprehend. We are pursuing 'resilience making' with students at a time when our collective ability to adapt has become a daily project, often overshadowing the routine demands of scholarly and artistic practice in higher education. This shift amounts to a diminishing resilience in our own systems within the academy, described as a multi-factor 'pedagogical frailty' by Kinchin and Winstone (2017). Stark among these factors are the global climate and extinction crises more persistently undermining the well-being and perceived agency of both students and teachers.

Many of our students in the international undergraduate degree in design share the urgency for action expressed recently by the student activist Greta Thunberg at the World Economic Forum in Davos:

"Adults keep saying: "We owe it to the young people to give them hope." But I don't want your hope. I don't want you to be hopeful. I want you to panic. I want you to feel the fear I feel every day. And then I want you to act."

"I want you to act as you would in a crisis. I want you to act as if our house is on fire. Because it is." (Thunberg, 2019, para. 20-21)

This paper communicates one response to crisis: new strategies for teaching resilience that create a space for transformative understanding and urgent action that develops collective agency, personal capabilities and capacities around design and resilience. We outline here our reflections on past teaching

practice and iterations of the ‘Resilience’ module, our inquiry into expert positions and voices in sustainability and resilience education, the learning journey we designed for students, and finally what this learning design offers colleagues who share our goal for adaptive action through design.

Sharing and building on past teaching practice

Our present teaching challenge follows three iterations of the ‘Resilience’ module, all led by an annually re-configured module coordinator and teaching team of three to four members. While resilience is an increasingly relevant concept with its focus on negotiating complexity, uncertainty and interlinking scales and levels across systems (Folke, 2016), it has often felt overwhelming and out of place in the setting of a five-week design course for undergraduate students.

Despite various efforts, it was often impossible to engage the students with enough stakeholders to understand a case study system sufficiently, nor to provide learning tasks that linked design practice and resilience in a coherent way. Previous student responses to learning tasks usually resorted to either communicating the concept and its relating principles, or to presenting design ideas that related to the wide field of sustainability, not making use of ‘resilience’ in a meaningful way. While we share the belief that “the concept of resilience provides an important conceptual framework for designers to navigate – or even celebrate – this complexity” (Sterner in Zaretsky & Parr, 2011, p. 166), we did not feel that we had reached a satisfying solution when it came to the design of a meaningful and responsive learning environment.

In this fourth iteration of the module, we wanted to bridge the gap between this undebated relevance and our aim to design for transformational learning that allows students to develop personal, professional, social-communicative and action competencies (Barth, 2015). As a consequence, we had to critically question our role as design *and* teaching practitioners, the role of the students, as well as the learning activities and their staging within the module.

The syllabus for the BFA program prescribes the learning objectives for the module to which our learning design responds:

1. Practically apply design as a change agent in relation to the concept of resilience
2. Conduct a design project in moving images focusing on the concept of resilience
3. Explore the conditions of resilience through design
4. In writing reflect on the possibilities of resilience and design from the perspective of sustainability.

The set of learning objectives emphasizes the practical dimension of design learning in accordance to the resilience principles. At the same time, our interpretation needs to create conditions for meaning-making by connecting to students’ values, previous knowledge and experiences, and offering a realistic

opportunity to engage with resilience that does not obscure that uncertainty and varying levels of control are inescapable features of resilience thinking.

Through reflection on previous experiences and module evaluation feedback, we also identified that the timing of the module at the conclusion of first year presents an opportunity for students to reflect on, and consolidate *all* their first year learning and personal development, at a more conducive pace than earlier, intensive modules.

Interweaving expert voices into resilience teaching

In matters of teaching resilience within a broader frame of design for sustainable change, we are still in a situation that requires us to break new ground. Despite a widespread concern for environmental and social degradation, paired with a strong belief in design education's responsibility and ability, we are only slowly understanding the implications for design and its teaching.

"...[I]t is equally remarkable that, after 40 years of expressed ecological politics and a decade since the generalized acceptance of climate change as a scientific fact, that high level education in design for sustainment (or as is sometimes now called, "transition design") should be so lacking – again despite rhetoric to the contrary" (Dilnot, 2017, p. 168).

Drawing on the extensive research knowledge base of the Stockholm Resilience Centre (e.g. SRC, 2018), we recognise our teaching challenge will not be solved by simply continuing to add sustainability keywords and concepts to existing curricula. The relevant question to ask is what is actually the goal of our educational efforts? Vare and Scott state quite rightly that "...our long-term future will depend less on our compliance in being trained to do the "right" thing now, and more on our capability to analyse, to question alternatives and negotiate our decisions" (Vare & Scott, 2007, p. 194).

In addition, throughout recent years an understanding of the teaching and learning implications of the challenges ahead has gained momentum, resonating with Stephen Sterling's observation that "the nature of sustainability requires a fundamental change of epistemology, and therefore, of both education and learning" (Sterling, 2004 in Wals & Blewitt, 2010). This position is echoed by Ioan Fazey's (2010) linking of personal epistemological beliefs (knowing how we know and think), higher order thinking and human development in teaching resilience. Consequently, engaging with sustainability (and resilience) means to "critically reflect on the inherent social norms and values and the underlying assumptions of the concept" (Barth 2015, p. 60), and to develop collective agency and personal capabilities that generate positive but perhaps unforeseen outcomes.

Drawing on the particular opportunities inherent in design practice and education, we aligned our subsequent questioning and pedagogy with place-based making approaches, guided by the integrative, multi-domain approach to sustainability education urged by Sterling (2014) - involving **knowing**, **seeing** and **doing** - and his earlier call to conjoin strategies to develop

learners' personal resilience with broader resilience science and thinking (Sterling, 2010).

We are therefore pursuing 'resilience making' with students as generative and adaptive action in the world rather than one narrowed competence to be developed among many (see for example Wiek, Withycombe & Redman, 2011). Instead, we aim to set up the conditions for a *lived* approach to capability development that challenges students' beliefs through action within the messy complexity of the systems they are inhabiting – as a function of being in a specific context on the planet for the three years of their initial design education.

Learning design: journeying and prototyping

Following review of the Stockholm Resilience Centre's comprehensive open, digital learning resources and our own (re)interpretations of the module learning objectives, we posed questions to ideate potential learning journeys through the module for students. In order to prototype the learning design, we positioned ourselves as co-students by asking, for example, what are we *doing* if we come to understand ourselves as 'co-citizens' and 'planetary stewards'? (SRC, 2018). How might resilience concepts such as 'diversity', 'adaptive capacity', 'redundancy' and 'feedback loops' be observed and experienced through both action and reflection? How does local, traditional ecological knowledge manifest across the interconnected social-ecological systems of specific places and cultures?

To this inquiry, we layered insights from anthropologist Tim Ingold's (2013) approach to meaning-making through embodied and sensory engagement with environmental phenomena, materials and cultural artefacts. Such shared encounters in place – if richly documented and represented by students' multiple voices – then create a platform for relational and inter-scalar modes of resilience making, over the duration of the module. Our approach was further informed by the 'eight ways' design learning framework visualized by Samantha Edwards-Vandenhoek (2018, p. 627) which carefully prioritises indigenous perspectives, values and ways of knowing and being (in the Aboriginal cultural context of East Kimberley, Western Australia). Together, these alternative models of 'knowing, seeing, and doing' helped us to apply resilience thinking to make connections between 'place', knowledge and value systems therein, and the particular social-ecological systems in which we are located.

Visualising our own learning design in Figure 1, place-based making activities are underpinned by foci on the self, the community and a local large-scale forest-lake system with corresponding progression from knowing, seeing and doing (Sterling, 2014). Each day-long making activity creates a platform for structured reflection via multiple dialogues with Stockholm Resilience Centre's resources: viewing, reading, peer discussion and sharing reflective documentation. Equal priority is assigned to other local actors who, for example, will share their local and traditional knowledge through the making activities focusing on the self, community and forest-lake system.

The initial making day is designed for reflection on and extension of personal resilience – experiences, beliefs, setbacks, strategies – that both consolidate the year's learning to date and identify opportunities for the weeks ahead. The second seeks to immerse students in a community setting centred on local foodways that will enable students to connect their daily food habits and consumption to regional systems and networks, as well as experiment with adaptive knowledge and skills. The third making day will locate students within a nearby forest-lake system with expert ecological guidance, where 'making' is experienced as enhancing conditions for other species and the natural phenomena with which humans are interdependent.

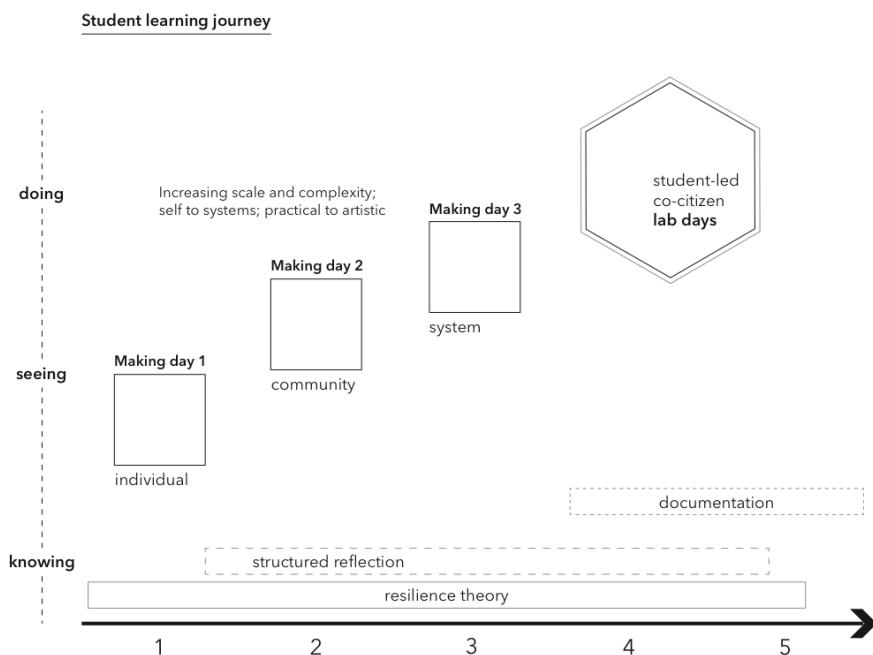


Figure 1: Student learning journey over five weeks emphasising the integration of knowing, seeing and doing via making activities with increasing system complexity and scale

Student-led adaptive action

The culminating student-led, 'co-citizen' lab days will present students with a design challenge centred on building greater resilience within the systems they inhabit as a function of their design education. Based on their experiences to date, they will be guided to devise and carry out strategies that build resilience at the scale of the individual, community and the broader regional system in which they are located, as well as draw on home country knowledge and experience. By explicitly framing this design-led action as 'design futuring' in Tony Fry's terms, it will be possible to connect students' initial focus on the self with deeper consideration of 'community' and its ecological functioning

(Fry, 2009, p. 114). They will also be challenged to work with timescales given they will spend another two years completing their degree, with potential to actively foster the resilience of their diverse learning community within a region in southern Sweden that is richly endowed with traditional knowledge and a history of adaptive practices.

In terms of learning progression, we expect students to be equipped for what Levy and Petrulis (2012) term an ‘authoring mode’ of inquiry-based learning, where we frame inquiry as design-led action that is dependent on exploration, critical reflection, discovery and unforeseen outcomes. The student cohort in focus is currently experimenting with activist modes of design process, and is accustomed to levels of collaboration and self-organising somewhat atypical of first year undergraduate expectations. The ethos of the program also promotes student-led initiatives and exercise of agency such that the 2019 Resilience module has the potential to further activate and amplify a range of concurrent informal curriculum projects across all year levels in the department.

Conclusion and next steps

The learning design we have communicated for ‘Resilience’ demonstrates one instance of how design processes can be harnessed for team teaching in design in response to deepening ecological crises. Our greater aim however, is to progress resilience making as design-led adaptive action that genuinely contributes to new ways of knowing and design doing – as co-citizens and planetary stewards – within the social-ecological systems in which we are all actors. By sharing this tentative and iterative approach and our firsthand experience, we hope to engage with, and learn from others who are leveraging place-based, creative approaches for resilience making.

The prescribed learning objectives reflect a common approach, in which the course content is driven by a popular topic in research and/or public discourse i.e. resilience. What remains less clear for teachers of design is how the topic can contribute to an innovative teaching and learning setting when, for example, making is narrowed in one of the learning objectives to "conduct a design project in moving images". We believe there are many more ways of making that a design student can, and should, engage with. In agreement with Barth (2015), we see the need for pedagogical creativity and an on-going process to build and continuously improve upon a variety of pedagogical approaches to the challenge we are facing. Our particular learning design has to enable a way to combine knowing and seeing with relevant acts of doing or making that go beyond the traditional notion of design making.

We acknowledge only lightly broaching the need to perceive and mediate the emotional side of inherent social norms and values that underly the concept of sustainability (Barth, 2015). As we experience more and more the stress experienced by students, as expressed by Greta Thunberg at Davos, the artificial division between the professional and disciplinary rationality of course syllabi and students’ emotional well-being clearly will not bear up.

As we implement the learning design outlined above, core questions persist: If we are to evolve our approach and facilitate resilience making with students, how do we as teachers and designers develop greater resilience at the scale of the self, the community and broader, interconnected systems? How do we mediate ‘pedagogical frailty’ and intervene in the latency of the academy’s response to planetary crisis? These are the questions that will drive our ongoing design inquiry and the collegial dialogues and action we intend to seed with this paper.

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2. Arctic and Sustainable Art and Design

Environmental values are in the core of designing sustainable futures. What are the networks and contents discussed above the Arctic Circle? How is design connected with geographies and politics in the North? What new approaches and case studies are taking place in sustainable design? What are the lessons learnt for academics and practitioners in sustainable art and design? Situated at the Arctic Circle, Cumulus Rovaniemi will take a special interest in topics that relate to sustainability and Arctic Art and Design.

Academic Papers

Study on Design Thoughts in the Decorative patterns of Suzhou Dwellings During the Ming and Qing Dynasties

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Abstract

Suzhou traditional dwellings are the material accumulation of Suzhou culture in the long river of history, which is very representative and regional in the dwellings of the Jiangnan area and even the oriental dwellings. However, in most studies of traditional dwellings, attention has been given to the relatively macroscopic aspects of architectural forms, architectural styles, and architectural cultures, while neglecting the architectural details like decorative patterns, which superficially discusses the decorative patterns of dwellings as a simple component of architectural decoration. So this article takes Suzhou residential decorative patterns during the Ming and Qing Dynasties as the research breakthrough point to explore and summarize the regional characteristics and the profound design thoughts contained in them. The findings of the research have led to the conclusion that the decorative patterns of dwellings is not one of the decorative means of architecture, because its profuse symbolic meanings, diverse functions, and unique artistic conceptions have played a key role in the creation of the overall style of the building matrix, the division of space, the presentation of decorative effects and the expression of regional characteristics. More importantly, it contains a wealth of design thoughts which are one of the most valuable design wisdom that leads Suzhou dwellings to achieve sustainable development in the long history. Therefore, the purpose of this paper is to provide useful reference experiences of sustainable development paradigms of national historic buildings in a rapidly transforming modern society.

Keywords

Suzhou dwellings; decorative patterns; design thoughts; sustainable design.

Introduction

Suzhou, designed and constructed by Wu Zixu in the Spring and Autumn Period in 514 BC, was the capital of the State of Wu at that time with over 2500 years' development history up to now. Compared with the North, there have been few wars in Suzhou since Five Dynasties, so the society here is relatively stable. And Suzhou is located in the abdomen of the Yangtze River Delta in China with flat terrain in the city, developed water network, agreeable climate, and abundant resources. Hence, it's known as the reputation of Heaven on Earth, which has become the dreaming place for men of letters. Although Imperial China changed from flourish to decadence in the Ming and Qing Dynasties, Suzhou had always been the most prosperous city during the periods across the whole nation (Linda Cooke Johnson, 2005), and lots of refined scholars, high officials and wealthy traders to come to build the house and live in Suzhou during the Ming and Qing Dynasties. Therefore, there are still a large number of residential buildings in the Ming and Qing Dynasties in Suzhou today.

The residential buildings are also the interactive material carrier with time, space, nature, society, buildings, others and themselves beside the actual residential function. Some valuable design thoughts have been formed in a long time of design practice of residential buildings in order to fulfil the interaction, and they reflect in all aspects of residential buildings. the decorative patterns of dwellings, however, as an important part of the building matrix, the reflection of which to the design thoughts of the period is the most concentrated and visualized. Therefore, this article takes Suzhou residential decorative patterns as the research breakthrough point in combination of the related knowledge of disciplines like design, architecture, semiology, and sociology, adopting a variety of research methods to explore and summarize the types and the regional characteristics of the decorative patterns of Suzhou dwellings during the Ming and Qing Dynasties. Based on the findings above, this paper comprehensively and systematically explores and explains the abundant and profound design thoughts contained in them with the purpose of instruction or enlightenment of people afterwards for the better residential building design so as to realize the sustainable development of the human living environment.

The types of Suzhou Residential Building Pattern during the Ming and Qing Dynasties

According to the theme and the symbolic meaning, the decorative patterns of Suzhou dwellings during the Ming and Qing Dynasties can be classified into eight main categories: plant pattern, animal pattern, auspicious animal pattern, utensil pattern, figure pattern, text pattern, geometric pattern and composite pattern. In addition, each main type of the decorative pattern of dwellings can be subdivided into lots of specific individual decorative patterns of dwellings, such as plant patterns can be divided into China rose pattern, wormwood pattern and lotus pattern, etc. And two or more single decorative pattern of dwellings in the same main classification or the different main classification can also be composed of the new combined patterns by a combination. For

instance, the Three Friends of Winter pattern is composed of pine pattern, bamboo pattern and plum pattern, as they(pine, bamboo and plum blossom) can grow in winter, so Chinese call them as the Three Friends of Winter; another example is the happiness and longevity pattern(see figure 1), it is a combination of bat pattern and "Shou" word pattern(one of the text patterns, it represents longevity), it symbolizes both happiness and longevity of residents in China. Hence, the frequency of single theme building pattern of Suzhou residential building patterns is pretty low in the Ming and Qing Dynasties, the composite one, however, the most.

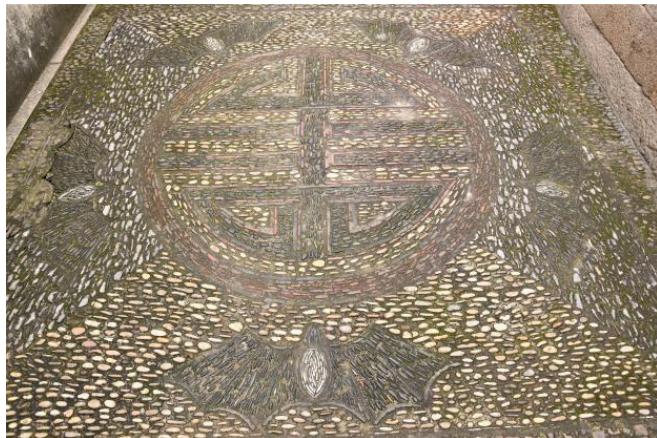


Figure 1. The happiness and longevity pattern in The Master-of-Nets Garden

The theme adopted for Suzhou residential building patterns in the Ming and Qing Dynasties is very diverse and its way of a combination is much more flexible, but in consideration of the symbolic meanings, the author classifies the decorative pattern of dwellings that looks like the composite one to the other types. For example, the author classifies some flower and bird patterns that seem like the composite ones to the corresponding bird ones in the animal patterns: the combined pattern of lotus and mandarin duck is classified to the animal patterns, as it mainly conveys the meaning of harmonious love between the spouses, and the mandarin duck is always regarded as the spouses of birds loyal to love, so the mandarin duck in the decorative pattern is the main role, but the lotus is just the supporting role. On the contrary, the author classifies some decorative patterns that seem like the individual ones to the composite ones such as the pine and crane pattern, because the crane is often the graphics centre of the decorative pattern. However, the pine tree, as the background, is usually easy to be ignored. Hence, some people will classify it as the crane pattern. But the author classifies it to the composite pattern in consideration of its complete meaning, as there is a popular saying in Chinese folk that pine trees and cranes have the function to extend our life. Therefore, the main classification of Suzhou residential building patterns in the Ming and Qing Dynasties is shown in the following table:

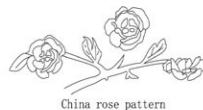
**S/
N** **Types**

Title&Sketch

1 **Plant
Pattern**



lotus pattern



China rose pattern



pomegranate pattern



gourd pattern



pine pattern



bamboo pattern



plum flower pattern



chrysanthemum pattern



orchid pattern

2 Animal Pattern



fish pattern



bats pattern



lions pattern



mandarin duck pattern



swallow pattern



deer pattern



egret pattern

3 Auspicious animals pattern



Phoenix pattern



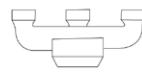
unicorn pattern

4 Utensil Pattern

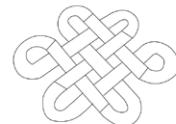


wishful pattern

fan pattern



bucket arch pattern



knot pattern



one of 24 stories of filial piety patterns one of figures of four professions patterns

5 Figure Pattern



He-He Gods pattern



one of figures from Three Kingdoms patterns



"Fu" word(happiness) pattern



"Shou" word (longevity) pattern

6 Text Pattern



"Xi" word(good luck) pattern



"Feng" word(harvest) pattern

7 Geometric Pattern



loop pattern



cloud air pattern

8 Composite Pattern



squirrel and grape pattern



pine and deer pattern



happiness and longevity pattern

Table 1. The main classification of Suzhou residential building patterns in the Ming and Qing Dynasties

It's required to be clear in the table above that Eight Immortals (see figure 2) is a kind of building pattern that originates from the eight immortals in Taoism without figure appeared in the decorative pattern of dwellings, but using their implements represented them, such as Han Zhongli is represented by the fan and Lu Dongbin is represented by the sword.

**Figure 2.** The Eight Immortals Patterns (Adapted from Liu Qiulin, 2010)

Regional Characteristics of Suzhou Residential Building Pattern during the Ming and Qing Dynasties

The regional characteristics of Suzhou residential building patterns in the Ming and Qing Dynasties from the sorting and induction of them are as follows:

1 Colourful Themes

It is important to note that the theme adopted for Suzhou residential building patterns in the period is colourful through the classification of Suzhou residential building patterns in the Ming and Qing Dynasties, they not only contain the material themes but also the spiritual ones. For example, the themes adopted for the decorative patterns of dwellings like China rose pattern, wormwood pattern and lotus pattern are China rose, wormwood and lotus respectively which can be found in the real life; and the themes adopted for the auspicious animals patterns like phoenix pattern and unicorn patterns are the Phoenix and unicorn, they both come from Chinese myths, and they only exist in the spiritual world of people.

2 Profound Symbolic Meanings

Each Suzhou residential building pattern in the Ming and Qing Dynasties is not only to decorate the building matrix, but all exist for their profound symbolic meanings, some for reasons by the object, some for dreams by the object, others for best wishes by pray. The detailed classification as below: ward off evils, happiness and prosperity, safety, good luck, health and longevity, harmonious family, prosperous of posterity, high quality and world Peace. Here come the sorted symbolic meanings of typical decorative patterns of Suzhou residences in the Ming and Qing Dynasties through several site surveys and related data:

S/N	symbolic meaning	Title
1	Ward off Evils	wormwood, gourd, the Eight Immortals, bamboo, Eight Diagrams, "Wan" word, etc
2	Happiness and Prosperity	treasure basin, copper coins, deer, wishful, Chinese Knot and China rose, etc
3	Safety and Happiness	"Fu" word pattern, the Peace of Four Seasons, bats, etc
4	Good luck	magpie, "Xi" word, etc
5	Health and Longevity	"Shou" word pattern, pine, crane, pine and crane , etc
6	Harmonious Family	mandarin duck, orioles, lotus, He-He Gods, etc
7	Prosperous of Posterity	Orchids, shrimps, crabs,swallows, unicorns, lions, pomegranates, egrets and lotuses, etc
8	High Quality	the Four Arts, the Three Friends of Winter, the Four gentlemen,figures from Three Kingdoms, 24 stories of filial piety, figures of four professions, etc
9	World Peace	"Feng" word, fish, lotus flowers, crab, etc

Table 2. Main symbolic meanings of Suzhou Residential Building Patterns in the Ming and Qing Dynasties

There were many symbolic meanings' expression techniques for Suzhou residential building patterns in the Ming and Qing Dynasties, mainly include symbol, euphony and metaphor. First of all, the symbol is to reflect some kind of profound abstract concept, idea or emotion according to its own property related to the other thing, such as the pomegranate has the property of many seeds, so the pomegranate pattern symbolizes the moral of many sons and much happiness. Secondly, euphony refers to use the same pronunciation but the different tune of characters and change with each other mutually, then form the new meanings. For example, in the pattern of remaining in successive years, the characters of lotus and successive share the same pronunciation as well as fish and remaining. Finally, metaphor means by virtue of one thing to describe the other in the two things in some relation, it can be divided into simile and metaphor: the simile means use one thing to describe the other on the condition of the relation between these two things is very clear, and all text patterns are simile; in contrast, metaphor is to use one thing to describe the other under the obscure relation between the two things, all geometric patterns and figures patterns are metaphors.

3 Multi-functions

The function of the decorative patterns of Suzhou dwellings mainly reflected in two aspects:

One is the material aspect, some building patterns are actually an architectural practical component with the purpose of fixing the other. As shown in Figure 3, the “Feng” word pattern component made of lime shows on the wall of Suzhou Kuojiatou Lane 4-6 Residence to fix the tiles on the wall.



Figure 3. The “Feng” word pattern on the Wall of Kuojiatou Lane4-6 Residence

The other is a spiritual aspect, some parts of building patterns also have the narrative function, enlightenment function and emotion expression function: the figure pattern in the Suzhou residents of the period has the strong narrative characteristic: 1. record the traditional cultures; 2. reflect the social customs; 3. Write the story of the theatre. For instance, Su Wu in the figure patterns is just recorded the historical allusions in the form of building patterns. It is well known that the mandarin duck is a couple of love birds pretty loyal to partners, Cui Bao in Jin Dynasty said that the mandarin duck is a kind of water bird, male and female have never separated, otherwise, either will die due to the love sickness (Tian Zibing&Wu Shusheng, 2003). So the mandarin duck symbolizes the harmonious love between the spouses, and the mandarin duck pattern enlightens people to loyal to partners, then the harmonious relation between the spouses can be built if so. The Four gentlemen pattern(see Figure 4) is the theme often adopted by many literati for their sanctum, representing the arrogant, pure quality, modesty and uncommon symbolic meanings respectively, then combine the architectural function of study as it’s the place where the owner to relax for rest, chant poetry and paint pictures, and read books and meet friends, so the Four Gentlemen patterns carry the feelings and aspirations from the owner who is longing to be the man with integrity.



Figure 4. The Four Gentlemen Patterns

Hence, the building pattern is a kind of building components rather than a kind of architectural decorative graphics, though it's discarded by the modern architecture, the history will finally proof that's a stupid action.

4 Strict Hierarchy

In ancient Chinese society, "rite" has always been the main idea of the ruler's governance of the country, which mainly reflects a hierarchy. Therefore, ancient Chinese architecture also reflects a strict hierarchy affected by it. As Lou Qingxi said: "The hierarchy of ritual system is realized in the building by the width and depth of the house, the roof form of the house, the degree and style of decoration, etc." (Lou Qingxi, 2001) There is no exception for Suzhou residential architecture in the Ming and Qing Dynasties. In this period, the level of the building can be judged from the theme and the degree of decorative density of the architectural pattern. Some large residential buildings have a high density of decoration and a variety of decorative techniques. There are a large number of decorative patterns, such as wood carvings, stone carvings and brick carvings and Soviet-style paintings, whether at the entrance to the building or at the roof of the building. There are also high-level subjects such as unicorn and Phoenix in this type of residential building. However, the decorative density of some small residential buildings is very low, except that in the ridge part, you can see some beautiful patterns (such as pomegranates, peaches and peony flowers), and almost no architectural patterns, the overall appearance of this type of residential building is simple and unpretentious.

5 Beautiful Artistic Concept

As an organic part of Suzhou residential architecture, Suzhou classical garden is the representative of Chinese classical gardens. Chinese classical garden, "it like traditional Chinese literature and art, is extremely poetic and artistic, and its highest aesthetic realm is 'artistic conception'" (Shengchong, 2009). so Suzhou residential architecture is also a very beautiful pursuit of artistic

conception. As a part of the building's mother body, the architectural pattern has a very important influence on the artistic conception of architecture. For example, in the Suzhou dwellings of the Ming and Qing Dynasties, especially in the literati residences, the Four Gentlemen Patterns are characterized by high spirits, pure character, ambition, and extraordinary customs. They not only express the spirit of the owner in an intuitive and intuitive way, but also played a certain role in educating the future, and more importantly, it expanded the spiritual space of the building, making the original limited architectural space instantly filled with artistic conception.

The Design thoughts in the Suzhou Residential Building Pattern in the Ming and Qing Dynasties

The research results of this paper imply that the architectural pattern of Suzhou residential buildings in the Ming and Qing Dynasties is a medium that coordinates the relationship between man and time, space, nature, architecture and ourselves, it mainly reflects three kinds of design ideas: learning from history, harmony design and sustainable design. These three categories of design thoughts are mainly to achieve a harmonious state between man and time, space, nature, buildings and ourselves, thus achieving the purpose of the sustainable development of people itself and living environment finally.

1 Learning from History

Chinese always focus on learning from the history, according to the document of Book of Tang that Li Shimin said the destiny of one nation can be known by taking the history as the mirror(Liu Xu, 1997), and it refers to the importance of history. Suzhou people were also stressed on learning from history in the Ming and Qing Dynasties. As time goes by, it mainly shows the strong design thoughts through learning from the history reflected in the design of the Suzhou residential building patterns, especially carry forward the profound traditional cultures. Suzhou is the birthplace of Wu Cultures, and it's also developed greatly at that time, which is a kind of Water-town culture as water is the soul in Jiangnan area, it's because the water that Wu culture was developed(Fan Hongwu, 2012). Under the influence of Wu Cultures that the city pattern of the double chessboards of parallel river and street, and water adjacent to land, has evolved in Suzhou (see Figure 5), and the theme selected for Suzhou residential building pattern in that period reflects strong hydrophilicity. For example, the lotus pattern is adopted for the bracket cushion of tiles building of Mingshan Tang, Dongshan old town, Suzhou with the quantity up to over 60 pieces, and types of water town specialities like fish, shrimp and crabs are wrapped up in the lotus pattern. Learning from history are actually Suzhou people to coordinate the relationship between people and the past by virtue of the patterns, and they protected the completeness and unification of the historical context of the city effectively.

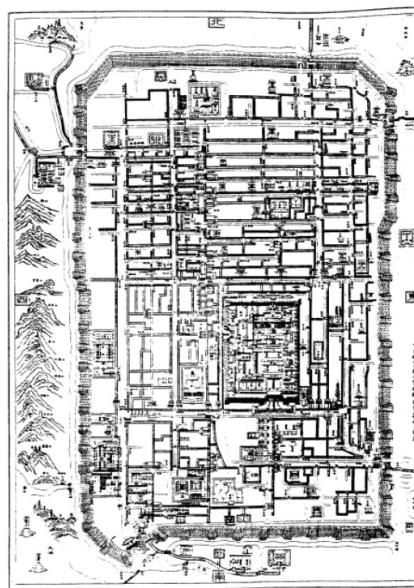


Figure 5. Song Pingjiang Picture (Adapted from Xu Minsu, 1991).

2 Harmonious design

Chinese traditional culture attaches great importance to the harmony of the universe, the harmony between man and nature, especially the harmony between people(Zhang Dainian and Fang Keli,2004). The harmonious design is the embodiment of harmonious thinking in the field of design, which means people coordinate the relationship between man and reality through the patterns, including many aspects like the relationship between people and nature, people and society, and people and people. In fact, it emphasizes the harmonious concept, that is, people coordinate the relationship between people and the environment, society and the same kind through architectural patterns to achieve a harmonious state.

In the Ming and Qing Dynasties, the production materials of Suzhou residential building pattern often followed the principle of adapting to local conditions and advocated take local materials. For example, stone carvings used local Taihu stone and brick carvings to use local water-milling bricks. There are two main reasons for this: for one thing, the local material is cheap; for another, the local material grows locally with good adaptation to the local climate. This reflects the idea of harmonious design, which is the most important design thought adopted by people at this period when coordinating the relationship between man and nature. It highlights that the natural law shall be observed while design activities are carried out based on which the subjective initiative shall be played fully to achieve the artistic conception of "although it is artificial, it is like natural"(Ji Cheng, 1957) and the harmonious state of man and nature finally.

As stated previously, Suzhou residential building patterns in the Ming and Qing Dynasties carry forward the Chinese traditional feudal etiquette system with a very strong hierarchy. The patterns like unicorn and lion, which are not allowed for the ordinary civil residences, would often be adopted for some officials' residences in the Ming and Qing Dynasties to reflect their social status and identities, for example, the unicorn pattern(see Figure 6) was used for the ridge head of hallway in Pan Shien's residence as he was NO.1 scholar in 1793, then acted as the Document Clerk, Advisor for Emperor and Housing Assistant Minister successively. In other words, the theme and quantity used for the decorative patterns of dwellings shall match with the owner's identity and social status. In fact, the hierarchical system of ancient Chinese dwelling buildings is the materialized form of the ruling class trying to create an ideal social order (Liu Senlin, 2003) , which is essentially a kind of political tool to coordinate the relationship between people and the society as it specifies people's social status and identities in the name of the country with a type of invisible order occurred, and the Order is of great stability to make the relationship between people and society become harmonious.



Figure 6. The Unicorn Pattern Ridge Ornament in Pan Shien's Residence

Interpersonal relationships incorporate many aspects, but the most critical one is the relation between husband and wife. The harmonious design thinking is the main design thought to coordinate the relationship between the spouses. For instance, many He-He Gods pattern taken place in Suzhou residential houses in that time. The He-He Gods(they are Hanshan and Shide) are two immortals of happiness in charge of marriage in folk. Therefore, the He-He Gods symbolize the harmonious family and happy marriage. However, the relation between man and himself in the interpersonal relationship would be ignored usually. Fortunately, it wasn't neglected in Suzhou residential building patterns as plenty of building patterns with beautiful symbolic meanings occurred in Suzhou residential buildings, which were all materialized representations of people's psychological needs. And it's obvious to see that Suzhou residential building patterns of the period greatly focused on the satisfaction of psychological demands, and the coordination of relation between man and himself from Suzhou residents of the period mainly followed the people-oriented design thoughts, which is also advocated by the Finnish famous architect Alvar Aalto who thinks that although it's reasonable for the modern building, it's not enough, so he proposes that the building shall focus on the psychological demands of people, as he said in his The Humanizing of Architecture: Technical functionalism is correct only if enlarged to cover even

the psychophysical field. That is the only way to humanize architecture(Alvar Aalto, 1940). This is the fundamental reason why the people-centred design idea also filled with the artistic concept of beauty in Suzhou residence during the Ming and Qing Dynasties as it meets the physiological demands of people. At the meanwhile, it also coordinates the relationship between the owner's realistic life and ideal pursuit to make the relation between man and themselves become harmonious.

3 Sustainable design

The sustainable design is a very important guideline in Suzhou residential building patterns in the Ming and Qing Dynasties, which is reflected in the design should focus on practical functions and reuse and redesign of waste materials. Superficially, it's mainly to coordinate the relationship between people and building, essentially, however, between people and the future.

The sustainable design was built mainly influenced by the building concept from scholars at that time. For example, written by the famous garden designer in Ming Dynasty in his book Superfluous Things that simple is better than vulgar(Wen Zhenheng, 1985), which explains that the design shall be plain and focus on the practical function instead of decoration; also stated by the famous aesthetician Li Yu in Qing Dynasty in his work that luxury is strictly forbidden as per the civil work, it shall be simple not only for the ordinary family, but high officials and the noble the same(Li Yu, 2000), which also stresses the design shall focus on the practical function and pursuit of plain instead of waste. Therefore, the design of Suzhou residential building patterns during this period, although having certain decorative functions, has more practical functions, such as the fixed building components, narrative functions, educational functions and emotional functions that have been pointed out in the previous section. Under the influence of stressing on the practical functions, people in Ming and Qing Dynasties still paid much attention to the reuse of waste and scrape. Ji Cheng, the famous garden designer in the late Ming Dynasty, said that: the waste tile and the waste brick can also be used, it's clearly stated that the waste and scrape like cobble, crock and porcelain pieces can be reused to create the building patterns with the artistic concept (Ji Cheng, 2015).

In addition, Suzhou architectural pattern design during the Ming and Qing Dynasties also followed the geomancy thought in order to coordinate the relationship between man and time, space, nature, architecture and ourselves to make it up to the harmonious state, the geomancy is the special design thought in China's architecture design, affected by Taoist thought highlighting the balance of Yin&Yang. So lots of building patterns warding off evils still existed in Suzhou residences of Ming and Qing Dynasties like the Eight Immortals, the Eight Diagrams and mythology figure patterns, they often were placed to the entrance to the residential buildings to work as the function of warding off evils. In some field interview, the author found that the local residents very respected the religious architectural patterns, and they said that these patterns can make them feel psychologically secure.

Conclusion

This study focused on the decorative patterns of Suzhou dwellings during the Ming and Qing Dynasties in three aspects, including the types, the regional characteristics and the design thoughts. The types of Suzhou residential building patterns are quite colourful, including the plant pattern, the animal pattern, the auspicious animal pattern, the figure pattern, the text pattern, the geometric pattern and the composite pattern. It is the rich themes and profound symbolic meanings of Suzhou residential building patterns that make them have the diversified functions, strict hierarchy and beautiful artistic concept, so the regional features of the decorative patterns of Suzhou dwellings residences are pretty remarkable in the period.

The research results in this paper observed that the functions of Suzhou residential building patterns in Ming and Qing Dynasties have not only the decorative function to beautify the building space, but also have the practical function to fix the building components, narrative function, enlightenment function and emotional expressions through the sorting and conclusion of the style and its regional feature. More importantly, where enormous and valuable design thoughts exist, mainly including learn from history, harmonious design and sustainable design, among which the learning from history ensures the completeness of city historical context; the harmonious design coordinates the relation between man and the reality to realize the harmony among man, architecture and nowadays by virtue of the building; and sustainable design highlights resources saving and reuse of waste materials to coordinate the relation among man, architecture and the future. It's apparent to find here that the dwellings in Suzhou not only meet the living function but also make the relations among man and time, space, nature, architecture and ourselves be the harmonious state to achieve the sustainable development of Suzhou residences.

Design thoughts are one of the most valuable design wisdom that condenses in building entities, and the reflection of the decorative patterns of dwellings, as an important part of building matrix, to the design thoughts in the period is the most concentrated and visualized. Therefore, this study is not only good for instruction or enlightenment of people to achieve the sustainable development of living environment, but also provide useful reference experiences of sustainable development paradigms of national historic buildings in a rapidly transforming modern society.

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– Reframing Arctic Design – Insights into a ‘North-ness Designist’ Perspective

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Abstract

This article presents insights into how the term ‘design’, and Arctic design in particular, is not defined and illustrated exclusively by professional designers. In this case, design is a fully loaded concept with meanings and practices attached by other experts, who are the ‘humans in the Arctic know’, thoroughly involved in an everyday and active life both in the Northern environment and of the North. First, Arctic design is reframed as a culture-based concept, according to Ingold’s (2018) conception of Northness or ‘North-ness’, found in his article ‘The North is Everywhere’. Second, ‘North-ness’ is examined alongside the concept of a ‘designist’, which was developed with a grounded theory methodology that applied theory-making principles in design research. A ‘designist’ is also a culture-based conceptualisation on how ‘designerly ways of knowing’ (Cross, 2006; Redström, 2017) and creativity are not abilities possessed exclusively by professional designers, but are instead embodied faculties created in humanity in general. Therefore, the third analytical concept in this article is ‘embodiment’, which originated from the embodied philosophy of Lakoff and Johnson (1999). In this article, the essence of ‘North-ness design’, or a ‘North-ness designist’ perspective, is embodied firmly and most visibly in contact with nature, which is in a human knowing herself/himself in the surrounding nature. This form of knowledge is also visible in Scandinavian, Finnish and Arctic, or Northern, design. This article contributes to design research from the intersection of human-centred design research, design consumption research and grounded theory.

Author keywords

Arctic design; North-ness design; North-ness designist; grounded theory; knowing nature; embodied philosophy; embodiment.

Introduction to Arctic, North and North-ness

The Arctic is extreme, with cold, icy and dark winter weather conditions. The summer is short, and summer weather is often fickle. As a counterpoint to the winter period of darkness, the sun does not set at all in the midsummer. Some local people suggest there are eight seasons in the Lapland. These and many other perceptions of the surrounding environment have an influence on Arctic culture, maybe even on Arctic design (Ylä-Kotola, 2012).

As a circumpolar North, the Arctic is easily seen as a periphery with extreme nature and unfavourable weather conditions with cold, ice and darkness (see UArctic, 2019; *American Heritage® Science Dictionary*, 2011). While they have close contact with nature, the people living in the Arctic and the North are not merely surviving and adapting. Research on indigenous people has proven that the Sami, for example, are familiar and happy with both their environment and their culture. However, the humanities and social science research of the present-day Arctic has only started to flourish. Through the modern and culturally sensitised references to Arctic tourism, Arctic Design and Arctic cultures, the image of the 'surviving' and 'adapting' Arctic created by the natural and environmental sciences (Ingold, 2018) is transforming into a more alluring perspective (Viken, 2012; Tahkokallio, 2012; Sturm, 2012). Although there is something captivating about the Arctic, these culture-based references to the Arctic and the North indicate that it is not yet explained satisfactorily by the humanities and social sciences (Hansson & Ryall, 2018; Ingold, 2018).

In this paper, the Arctic, and from now on the North, is discussed as a culture-based concept (Leong & Clark, 2003) based on a conception of Northness or 'North-ness', as defined by Ingold (2018). According to Ingold (2018, p. 109), since 'The North is everywhere', the essence of the North is to 'be a kind of history, not a global region', 'a history *from* the North' that is doable, even in other regions, in the West, East and South. This reframes Arctic Design into North-ness design, based on an idea of design *from* the North. Instead of reinforcing clichés of 'Arctic states and mentalities' (Buchanan, Nikula, Ahlbäck, Calbrese, & Jeschke, 2009), this article shows how these states and mentalities (i.e. Northness) can be found and discovered in research and how these stages and mentalities are essentially embodied in human beings (i.e. North habituated them to North-ness).

The paper presents insights beyond a conventional definition of design and design studies, as according to Tonkinwise (2014, p. 31):

As a consequence, it is perhaps time for Design Studies to stop being merely 'for design' in the sense of being servile to what designers might choose to design. Design Studies needs to be more 'for something' that it takes to design, that it makes design servile to. Committing to a value is still pedagogic of the place of (other) values in the decisions that design makes to change the material history and practices of our societies. But that commitment would give this or that Design Studies program, in its research and teaching, a coherence that could resist the surge of capitalism toward this or that technological imperialism. It could be a commitment to beauty or a faith; it should be a commitment to re-localizing and decarbonizing economies.

Tonkinwise's view of the new role of design studies as being more than merely 'for design' converges with the conception of resilience defined by Evans and Reid (2014, pp. 41–42), whose theme is pivotal to the Cumulus Rovaniemi 2019 Conference, where the current article is presented:

To be resilient, the subject must disavow any belief in the possibility to secure itself and accept instead an understanding of life as a permanent process of continual adaptation to threats and dangers which are said to be outside its control. [...] The resilient subject is required to accept the dangerousness of the world it lives in as a condition for partaking of that world and accept necessity of the injunction to change itself in correspondence with threats now presupposed as endemic and unavoidable. [...] Resilient subjects, in other words, have accepted the imperative not to resist or secure themselves from the dangers they face.

In the following chapters, a review is presented of how resilience can be seen as a part of everyday life in the Arctic and how this factor influences how Arctic design is manifested as something extraordinary coming from the North as well.

Culture-based Approach: Designists and North-ness Design

This article presents insights into how the concept of design, especially Arctic or North-ness design, is expanded on a culture-based concept that is fully grounded in the practices and meanings attached to it by the people living their everyday lives in the North, or the North habituated them to North-ness. This article contributes to design research from the intersection of human-centred design research, design consumption research and sociopsychological research on human processes methodology (i.e. a Glaserian approach to grounded theory).

The design research literature discusses the leading edge of design consumers, the end-users of products, as lead-users, professional amateurs (Pro-Ams), and enthusiastic amateurs or 'connoisseurs' (Hennion, 2007; Leadbeater & Miller, 2004; von Hippel, 2005). In this study, a theoretically sensitive concept of a 'designist' is extended to the classification of the end-users, or the consumers, of the designed products. In addition to North-ness, this other conceptualisation condenses the core of this paper into one word, 'designist' (i.e. a 'human in the Arctic knows' or the 'humans in the Arctic know').

Along with the concept of the designist, this article additionally suggests how the essence of the knowing of the end-users can be seen as designerly when studied from an embodied sense-making perspective. This article presents how designerly ways of knowing are embodied and become visible in the end-users' activities when interacting with their surroundings and settings through, for example, manipulating materials and objects.

The 'designist' is a concept that bridges the gap between professional designing and consuming or using products. Developed with a grounded theory methodology, the concept proposes a new perspective on design theory

regarding how ‘designerly ways of knowing’ and creativity are not abilities possessed exclusively by professional designers, but instead are faculties that are embodied in humanity in general (Cross, 2006; Glaser, 1992). The current article presents a perspective on this embodied human action. Practices are presented through an example of laymen—who are strongly attached to numerous activities that take place in the surrounding environment and who manipulate and utilise nature that habituates them to Northness—making things in designerly ways in the North. In this current article, there are a few examples and insights into a more practical design theory framework presented for how human practices could be operationalised based on an embodied sense-making approach when doing human-centred design.

According to the data analysed, the end-users of the designed products can be extremely demanding on themselves in terms of what kinds of products they should use and how they should use them when purchased. One reason for the severity of this demand is the ecological attitude towards consumerism. In comparison, the designist attitude towards consumption starts by becoming conscious of one’s embodied practices in a place, such as when trekking in the wilderness, which includes reflecting on one’s movement against one’s abilities to control the equipment in changing natural surroundings. One interviewee, an experienced hiker, described his enthusiasm about nature as ‘learning to know nature’ and ‘to learn to move in nature’. According to this 55-year-old man, his learning never ends: ‘Knowing nature by moving in nature’ is not merely wandering around without any particular aim to interact with it. You learn how and where to pick berries and mushrooms and how to catch fish or game animals to eat. If the aim is to see and feel the scenery, you must sort out an interaction plan for how to achieve that goal with nature. Silence and listening in nature is repeatedly mentioned in the data (see Veijola & Säynäjäkangas, 2018). Humanising nature is typical (DiSalvo & Gemperle, 2003). The familiar wilderness and forests are seen to grow during one’s lifetime. According to Ingold (2018, p. 109), this is one of the key notions in North-ness (i.e. history from). The life cycle of these large areas of wilderness is learned during decades of practising in interaction with them and the knowledge of nature is exceptionally wide and holistic. In this sense, the North remains a complex entity, a challenging place for the outsider to live. However, to these humans in the Northness know (i.e. the people used to living in the Northern and Arctic conditions), this is not even when there are ongoing transformations in the Arctic, such as the growing flow of tourists, global warming or changing means of livelihood. In a sense, they are designers of their own familiar surroundings. This kind of local knowledge also embodies transformation and change.

Data: Embodied Experiences in Design Consumption

Empirical data were gathered about user experiences of design consumption in the contexts of outdoor sports and leisure activities. A general connection between designing and design usage is attached to materiality. When doing design research from the social sciences point of view, a related area of research is design consumption (Miller, 1987). Through an embodied perspective on design consumption, materiality is broadened from inert to animate materiality, which has previously been studied in design, such as with reference to Latour (2005) and the actors involved in a multitude of networks

(i.e., actor-network theory, ANT). In this article, embodied materiality in human activities is seen as metaphorically guided (Lakoff & Johnson, 1999).

The qualitative data were gathered in two phases from 23 Finnish outdoor sport groups ($N = 85$) comprising women and men who regularly engage in winter and summer outdoor sports. The first set of data was gathered during 2004–2005, consisting of semi-structured group interviews with 16 groups of golfers, sailors and hunters ($N = 48$). The second set of empirical data was gathered during 2006–2008, consisting of similar group interviews for seven sports groups ($N = 29$) of ski-trekkers, snow-boarders, snow-surfers, climbers, canoers and downhill bikers, including additional self-assembled ethnographic videos made by the groups. The first phase of open coding according to the grounded theory methodology was completed with the data gathered from golfers, sailors and hunters. This first phase of analysis illuminated the direction to take the study by theoretical sampling, such as where to focus the extended data collection during 2006–2008. Instead of the more general-level description of the design consumers' experiences and behaviour completed in the first data collection phase, the theoretical sampling was focused on the embodied practices of the outdoor sports enthusiasts. The extended data collection was heavily controlled by emerging theory (Glaser, 1978, p. 36), or what Glaser termed deductive generating. It serves as an inductive method rather than as deductive, hypothesis testing research (Glaser, 1978, pp. 40–41).

In the outdoor sports data, climbing, ski-trekking and hiking were well represented. All the sports enthusiasts who participated in this research freely volunteered for interviews and for having their activities documented for research purposes. The aspiration to develop one's hobby was obvious and suggests a strong comparability to designerly ways of knowing, reasoning and action. Whereas the focus at this point of the analysis has been on conceptual elaboration, and data collection has been based on theoretical sampling, the question asked from the data is how do outdoor enthusiasts represent their way of life designerly, and *how do they focus on material and embodied practices involved in their hobby?*

According to Lakoff and Johnson (1999, p. 16), concepts and reason are embodied. This means that human perceptual and motor systems play an essential role in shaping the particular kinds of concepts human understand, create and use: colour concepts, basic-level concepts, spatial-relations concepts, and aspectual, such as event-structuring, concepts (Lakoff & Johnson, 1999, p. 16): 'Reason is not independent of perception, motion, emotion and other bodily capacities', stated Lakoff and Johnson (1999, p. 17), who continued that 'Living systems must categorize. Since we are neural beings, our categories are formed through our embodiment. What that means is that the categories we form are part of our experience'. The analysis emerging from the data of user experiences is similar to the description above, full of categorisations using perception, motion, emotion and other bodily capacities, as one ski-trekker briefly described with respect to a moment of his skiing activity: '[...] ski all day in the rain and hail and windy weather yea, and you come back and you [...] the whole body felt ragged, and your face felt like wind beaten and then like cold wet hands [...] and if like woollen skiing calmets somehow let us to survive [...]'.

In natural surroundings, the embodied nature of language appears clearer since experiences and perceptions are simpler, and the used words and concepts are entwined with the elements appearing in the natural environment instead of the complex concept construction taking place in more heavily built environments. Movement of the body and use of all the senses for perception in nature are different from human action indoors, in small spaces such as offices. More often, human perception is focused only on a screen, and movements are restricted to only eyes and fingertips to scroll the screen. Sadly, the anxiety felt over the complexities of today's society may be caused by an artificial construction of reasoning and concepts that does not make embodied sense. The reason is at variance with embodied understanding. The 'designists' has not agreed to these requests of limited bodily capacities. Compared with only sensing nature, functional relations with nature have more impact on the creation of a positive attitude towards nature (Valkonen & Salonen, 2013).

In this article, four examples of primary metaphors are presented that can be applied in the development of participatory design methods. Grady has defined 24 primary metaphors that are components of more complex metaphors that humans use despite the lingual differences between cultures (Lakoff & Johnson, 1999, p. 49). In short, embodied philosophy explains the cultural differences derived from the distinct environmental surroundings with which people have mainly interacted. For example, the Inuit have plenty of terms to define snow, ice and cold, while the Bedouins have just as many words for describing sand. In this article, four categories of Grady's basic metaphors that emerged in the data and define a designist's action are presented (Lakoff & Johnson, 1999, pp. 49–54):

1. Upwards orientation (bodily and vertically).
2. Change as a movement (bodily and in a space).
3. Knowing as seeing and touching.
4. Categorisation as closeness and containers.

The 'categories are containers' metaphor was one of the most repeated basic metaphors in the data and grounded the theorisation that emerged in this study. Primary experience of the container metaphor is that when one is observing her/his surroundings, the things that go together in certain categories tend to be physically in the same bounded region (Lakoff & Johnson, 1999, p. 51). It makes sense when thinking, for example, of consumer behaviour in relation with branding, product segmentation and selling products. Products grouped under a certain brand are sold in brand stores or in their own sections inside stores. On the other hand, affordable and mass-produced articles are placed in another category or physical container, e.g., located on the fringes of the cities in discount stores or outlets.

Developing Design Theory: Grounded Theory

A 'designist' is a theoretical concept developed with a grounded theory methodology by the author in her dissertation. This article presents only one part of the whole study, in which the Glaserian grounded theory methodology is applied to developing design theory about the designist. The concept refers

to end-users of products as aesthetically capable creative actors, to some extent comparable to designers (Kotro, 2005; cf. lead-user by von Hippel, 2005). While a final grounding of the theory is still ongoing, this article focuses on one of the four subcategories that have emerged so far. This subcategory is called the 'designist' category and serves as an analytical tool to help describe how knowing is an embodied human practice and, as such, is an essential part of 'designerly' activities among the end-users of designed products.

This research focuses on bridging the gap between human-centred design and design research. The human-centred design is empathic, starting from user experience and user understanding and continuing to user involvement in design through participatory methods and tools. In this article, the method for bridging the gap is a grounded theory methodology. According to Redström (2017, p. 25), 'making' design theories needs support to conceptualise, express, make, put into words, communicate, and collaboratively create. Also, something particular and special. Redström (2017, p. 24) also mentioned as a design research approach 'a tactic of intermediaries', where the focus is actually on the tension between general theoretical and particular practical knowledge. In this article, it is suggested that this approach is very close to the aim of grounded theory research, focusing on 'subjects' main concerns and how they are processed [by those people]' (Glaser, 1992, p. 14).

According to Glaser and the grounded theory methodology, the ongoing orientation towards the development of research methods in the design research field indicates the need to solve the mystery of qualitative user research and analysis by explaining the core principles of basic social processes (Glaser, 1978, p. 5) and subsequent theory generation. Theorisation of design in general, and especially from the user experience point of view, is not seen as the most relevant area of design research. However, grounded theory has common goals with empathic, user-centred and service design research, and the concept of a designist created in this research is referred to as a new kind of understanding of a creative and practitioner type of end-user.

In the design, the research focus is on research through, for or about design; while in social sciences, the research interests under study are social processes, hierarchies and mechanisms. Research about design is the area of theory-sensitive design research. Previous studies combining social scientific approaches, methods and design research focused on social interaction between designers, users and products, such as user interfaces. In grounded theory, the focus is on systematic qualitative analysis of the data, searching for social processes and problems (i.e. the sociopsychological organisation of the people to be discovered in their own perspective) (Glaser, 1992, p. 5). Based on this approach, the article presents insights into the nature of designing and designerly knowing as a sociopsychological process in layman's terms, as illustrated by Glaser (1978, pp. 5, 13). Product semantics or semiotics is also often referred to as interpretations of how product features have positive effects from the end-user and consumption points of view. The grounded theory methodology also helps fill the gap between semiotics/semantics (Matozzi, 2010; Vihma, 2010) and design research, with the former focusing on representations in language and the latter focusing on human action and practices leading to designerly knowledge (Cross, 2006).

There are three main challenges in applying grounded theory methodology to the field of design research: (a) the need for a systematic analysis of qualitative data, (b) the lack of time used for analysis and theory generation, (c) and the absence of verification and testing by forced questioning. According to Glaser (1992, p. 67), 'Grounded theory looks at what is, not what might be, and therefore needs no test'. One may then ask why use grounded theory in design research when there seems to be such disharmony between time-consuming research and the urgent needs of research for design? Let us look a bit deeper. Understanding the user experience, stakeholder involvement – or partnering, according to Glaser – and finally the whole 'fuzzy front end' of a design process in general could be seen as an investment in a successful design. The elusive aims of design for user and stakeholder commitment, and even sustainable consumption, are achieved by research that results in substantive theories in the field. User and stakeholder commitment comes after the user or stakeholder or 'the [woman or] man in the know, the layman' is able to see the theory as somehow useful, claimed Glaser (1978, p. 14). Otherwise, it is a waste of time to him or her. An undeniable merit of user-centred design and design research is its ability to concretise this goal of usability already in practice so that it 'makes sense in the world' to laymen (Glaser, 1978, p. 14).

Theoretical sensitivity is closely related with theoretical sampling in grounded theory, in that particular order. Theory is gradually built up inductively from the progressive stages of the systematic analysis of data (Glaser, 1978, p. 39, 1992). Data collection is also a gradually built-up process according to an emerging theory based on the data. Conceptual sensitivity is essential to theory generation in the first place, and extended data collection is based on the systematic analysis of the existing data. That is why it is called theoretical sampling. Notable is that 'theory' is here solely referred to as conceptualisations (i.e. the theory emerges from the qualitative analysis of the data, not from something read in the literature beforehand). The literature comes in last in the chronological timespan in the grounded theory process.

From the point of view of a description of a substantive research area in this article, this stage of the grounded theory research process is of critical interest when it comes to a special quality of design or 'designerly' (Cross, 2006) knowing practices in the Arctic. The findings in this phase of emerging theory (designing in, for and about the Arctic) has led to theoretical sampling (i.e. controlled data collection for comparative analysis) (Glaser, 1978, p. 36).

North-ness Designist: Embodied Sense Maker

Essential to Arctic practices and practitioners is the everyday connection to nature, even outside the recreational purposes typically attached to an interest towards nature. The human in the know (i.e. the designist) in the current article is different from a general idea of a design consumer. The designist, for example, has a certain understanding of time, materiality and bodily movement in the natural surroundings: In the natural environment, time metaphors are extended into longer periods and include wider scales according to large geographic areas, whereas the time metaphors used indoors become shorter when proportioned to smaller spaces. Of course, digital and virtual reality technologies have enabled new kinds of embodied reasoning and

metaphorical knowing; these have become present-day generalisations in embodied reasoning.

The second category of metaphors focused on in this article are about motion and thus refer to change: The ‘time is motion’ metaphor is also closely linked to the reasoning of change (Lakoff & Johnson, 1999, p. 52). A primary experience of change is ‘experiencing the change of state that goes with the change of location as you move’ (1999, p. 52). Moving yourself through space has essentially the same meaning as action in primary human experience. Especially, bodily movement is described often in the analysed outdoor sports data. Finally, the ‘moving as a change’ metaphor culminates as a designernly relevant metaphor: ‘purposes are destinations’. The sensorimotor experience of this is reaching a physical or geographical destination (Figure 1). The aim of design is a solution: a sort of destination having a figure of an object. The primary experience of that metaphor is ‘reaching destinations throughout everyday life and thereby achieving purposes’ (Lakoff & Johnson, 1999, p. 53).



Figure 1. Illustration of embodied reasoning by a hiker.

In the picture above, two other categories of metaphors attached to the designist’s knowing are also presented: upwards orientation, both bodily and vertically, and knowing as seeing and touching. The upwards orientation metaphors are intriguing, especially in the Arctic context. A geographical location in the Northern Hemisphere is not as strong a determinate of the upwards orientation and ‘controlling things from above’ as is the real force given by gravity in forcing physical objects from above, not to mention the human desire to climb from the bottom of a hill or mountain to the highest peak. The human desire to ‘reach the peaks’ both physically and mentally

seems to be a very strong embodied way of human reasoning. The 'upwards orientation' metaphor is finalised within the same example of climbing by the primary experience of 'feeling up', (i.e. feeling happy and energetic and having an upright posture). 'Happy is up' metaphor is sensorimotorically domained by bodily orientation. (Lakoff & Johnson, 1999, p. 50)

The metaphor of 'knowing as seeing and touching' is also closely present in the data consisting of outdoor sports experiences. This category was emphasised in the research in the first place, since the user experiences were mapped from the sports equipment development and design research point of view especially, where the sensorimotor domain in the knowing primarily involves touching. The primary experience is in 'correlation between the visual and tactile exploration of objects' (Lakoff & Johnson, 1999, p. 54). From the research process and analysis point of view, this was not obvious until the theoretical sampling phase, where this dimension of 'knowing as seeing and touching' became relevant. Alongside the interpretation of the textual and literal research data, the visual data, including photos and video excerpts, were examined. At this point, it became obvious how crucial embodied interaction with the surroundings and with other people is in designerly sense making. As self-evident aspects of designerly knowing, these have been previously, clearly excluded in research on the knowledge of design consumers or end-users.

Conclusion

From the perspective of efficiency, design has the power to change and solve complex issues. However, to do so, it needs to be done in a socially sustainable manner. In this article, a few notions and insights on human behaviour are pointed out for making design theory support human-centred designerly research practices and methods. Design research discussions cover such things as the themes of empathic and participatory design and service and social design where the user is in the centre of the design. In this article, this is set as a starting point for the discussion of culture-based design philosophy.

First, there is the notion that it is a natural human tendency to aim for simplicity and transparency in reasoning. This is a clear aim of design as well. Reasoning for a better design is based on sense making (Kettunen, 2013). Second, sense making is embodied sense making. This is the intersection of designer and designist practices: Both have a similar sensing apparatus and the ability to move themselves and manipulate objects (Lakoff & Johnson, 1999, p. 17). This is where empathic design, participatory design and service design start. Their approaches are defined as user-centred, customer-centred or human-centred. Once more, there is the question, who is the user and who is the designer from an embodied reasoning and philosophy perspective? Based on the grounded theory of a designist as an embodied sense maker, as argued in this article, the answer is both.

From the design research perspective, research on design consumption encompasses the usability of products and services, the interaction between computers and people, and to some extent, social interaction as well (Battarbee, 2004; Koskinen, Mattelmäki, & Battarbee, 2003; Kurvinen,

Koskinen, & Battarbee, 2008). In the social sciences, the focus in consumption research is on social structures, such as social classes, consumer groups or subcultures, as well as on other modes of identity construction and representation (Bourdieu, 1984; Dittmar, Halliwell, Banerjee, Garðarsdóttir, & Janković, 2008; Miller, 1987). The theoretically sensitive approach to design research is an intersectional solution that focuses on research on human sociopsychological processes and problems when developing participatory and empathic design methods. Again, culture-based concepts and theoretical sensitivity are needed.

The core of numerous design challenges is social in nature and social processes and problems are not easily solved exclusively through design and mainstream design theorisation. Therefore, according to this study, the intersection where design, designer, user and other actors capable and willing to construct their own meanings of life is a critical area for design research. Service design, for example, has taken this as a starting point. However, if the process is led only by technology or design, without sociocultural sensitivity recognising those many meanings, knowledge and/or theory of social processes and practice(s), the results will lead to unsustainable change dominated by mainstream Western conceptions of the phenomenon and will be unable to bring transparency, clarity or solutions to the numerous complexities.

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Professional Papers

Indigenous Arctic Fish skin clothing traditions: Cultural and ecological impacts on Fashion Higher Education

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Abstract

The use of fish skin is an ancient tradition in societies along rivers and coasts around the world and there is evidence of fish skin leather production in Scandinavia, Alaska, Hokkaido, Japan, northeast China and Siberia. For Arctic indigenous people, their relationship with fish plays an important role in maintaining their identities creating important ties with the environment. The Arctic is undergoing dramatic climate changes threatening indigenous people, impacting their food security and traditional knowledge systems as they rely on fishing activities for their physical, cultural and spiritual well-being.

This research looks at how the use of fish skin by aboriginal Arctic people has recently been assimilated as an innovative sustainable material for fashion due to their low environmental impact. Fish skins are sourced from the food industry, using waste, applying the principle of circular economy. This paper describes the Fish skin workshop delivered at the world's biggest fish skin tannery: Atlantic Leather in Iceland, where an experienced Swedish craftsperson passed down the endangered Arctic fish skin craft to the next generation of Nordic students from universities in the circumpolar area (Iceland, Denmark, Sweden, Finland) and UK as part of a sustainable fashion higher education program. The methods

of sustainable material engagement and the full immersive experience through a teaching-in-the field approach are recommended as transferable skills for educational models. The workshop demonstrates how relevant the Indigenous fishskin knowledge -in partnership with sustainable design strategies- can connect people to their culture, communities and the environment.

Author keywords

Indigenous peoples of the Arctic; Fish skin craft; Traditional Knowledge; Food Industry By-Product; Fashion education for sustainability.

Introduction

The research is investigated through author 1 and 2 current practices as educators, supporting fashion design students to engage in sustainability facilitating the use of fish skin as an alternative raw material for fashion. This research is an interdisciplinary study of northern indigenous Arctic fish skin heritage, building connections between anthropology, ethnography and environmental protection to address current global issues of fashion sustainability at a time when the changing Arctic environment and its wider impacts are receiving widespread attention. The aim of the project is the preservation and dissemination of cultural heritage connected with fish skin taking into consideration the sustainable limits of the planet's natural resources.

Main research questions

How can we protect sustainable development of cultural heritage connected with fish skin?

How can we assist fashion students and educators in developing sustainable fish skin material by sharing traditional crafts from Arctic indigenous people?

Contribution to knowledge

The project addresses gaps in knowledge in the fields of: Intangible cultural heritage preservation connected with fish skin. Sustainable design education, inspiring students to develop environmentally responsible new processes for fish skin to advance material innovation. New participatory design practices with craftspeople. Because fish skin craft is not an aspect of Arctic culture that is commonly studied, this research attempts to fill a gap in the literature of the Arctic indigenous communities and will call for further research on the topic of Arctic crafts, Arctic ethnic identities and their representation in society today.

Aims

Blend the highly qualified skills of the fish skin craftsperson with cutting-edge sustainable design education. Map existing traditional knowledge of fish skin processing. Take students out of the classroom and into nature contributing to the learning experience about sustainability to change students' mind sets. Identify tools about best practice on fish skin craft and test the ideas at Fashion Higher Education institutions.

Objectives

Position fish skin craft to exemplify best practice in the field of fashion design higher education. Promote living with environmental change, using fish skin leather as a by-product of the food industry to reduce waste and to change consumer behaviours. Community Resilience: Develop case studies working across indigenous communities with historical use of fish skin to foster narratives of social sustainability. Implement a material-based design methodology for creating new crafting procedures for fish skin leather.

Background

UAL

UAL is Europe's largest specialist arts and design University, with more than 3,000 academic, research and technical staff and about 19,000 students from more than 100 countries. UAL is actively engaged in research and innovation as well as artistic, cultural and education projects and its overall quality profile placed it in the top 25 of UK Universities. UAL has been a pioneer in the development of practice-based and practice-led research in creative fields. Elisa Palomino is the BA Fashion Print pathway leader at Central Saint Martins and researcher at the Textile Future Research Centre (TFRC). She has experience of running successful network projects (e.g. EU Horizon 2020-MSCA-RISE FISHSkin 823943. FISHSkin a Sustainable Raw Material; EU COSME WORTH project: Fish leather in the Luxury Industry, Recipient of Fulbright Scholar Award: 'Arctic Fishskin clothing traditions' at the Smithsonian Institute)

IUA

Iceland University of the Arts is a self-governing institution providing higher education in fine arts, theatre, dance, music, design, architecture, and art education. IUA combines Iceland's long tradition for sustainability with the aesthetics of Nordic design. The University is a member of the Arctic Sustainable Arts and Design network consisting of art and design art education universities in the circumpolar area. (Canada, Iceland, Norway, Sweden and Russia). Katrín

Maria Káradóttir has extensive experience using unconventional textiles, she is a slow fashion pioneer in Iceland and is interested in building new systems focusing on sustainability, low environmental impact, thinking about the origins and end-point of textiles. She is a partner of the consortium EU Horizon 2020-MSCA-RISE FISHSkin 823943. FISHSkin a Sustainable Raw Material.

Lotta Rhame

Lotta Rhame is a Swedish craftsperson who has been working with traditional tanning and processing since 1982. She has lectured and led many workshops throughout the Arctic region. Much of her knowledge comes from visiting cultures where skins are still cured using traditional methods: the Inuit's in Greenland and Canada, the Native Americans and the Sami in Scandinavia as well as by studying archaeological sources and experimenting with them to adapt recipes. Most of these ethnic minorities have lost the traditional skills of tanning fish skin, but they have passed down to her the oral history inherited by their ancestors. She has retaught a number of Sami communities the lost craft and they are now able to transfer the acquired knowledge so the tradition stays alive. She regularly holds traditional fish skin tanning courses and lectures worldwide.

Joseph Boon

Studying fashion at Central St. Martins, Joseph Boon made his final collection out of fish skin that he hand-tanned from Billingsgate fish market. Working with fish skin for over three years, he has been to and met some of the world's most recognised fish skin leather producers in Iceland, Japan and China.

Historical context

According to Rahme (2012), making leather from fish skin is an age-old craft historically used by many societies along rivers and coasts around the world. Jiao (2012), describes that before synthetic fibres were invented, people clothed themselves with natural materials available in their surroundings such as fish skin. The shortage of raw materials and omnipresence of modernity have challenged the preservation of the fish skin craft. Better access to the modern world meant that Arctic people were able to access textiles like cotton and silk to create their clothing, leaving fewer people to develop the traditional fish skin craft and there are currently only a few people left who know how to create these fish skin garments.

Environmental context

Protecting natural and cultural resources

Yoshitaka (2017) argues that the relationship with the sea plays an important role in maintaining the identities of Arctic coastal indigenous peoples as distinct cultures but climate change is threatening their ties to oceans and marine

resources around the world. Preserving fish skin traditional knowledge is essential to the Arctic world. This paper seeks to draw attention to the vital importance of traditional fish skin craft to the Arctic people as a basis for their culture and a component of their identities and to encourage their artisans to re-introduce the skills used by their ancestors, making a tool for community development.

Fish waste: Use of fish by-products by the fashion industry

The use of fish skin by aboriginal peoples in Arctic communities has been recently assimilated as an innovative sustainable material for fashion due to the low environmental impact. Fish skins are a by-product of the food industry, using waste, applying the principle of circular economy. Fish skin leather processing prevents the throwing of skins into the ocean and could significantly reduce marine pollution and sustainably protect marine ecosystems. There is a trend in the fashion industry toward the adoption of new materials which have a lower environmental impact than their conventional alternatives (Textile Exchange 2016). Fish skin is an innovative and sustainable alternative material with a lower environmental and social impact than conventional leather.

The use of fish skin by Icelandic people

For much of their history, Icelanders wore shoes made of wolf fish skins processed using traditional tanning methods and they measured distances by how many pairs of fish skin shoes would be worn-out walking over the path (Rahme, L. 2012). Anthropologist Mould (2018) mentions that each shoe was cut from a single piece of fish skin, with a vertical seam at the heel and a seam at the toe. The fish skin was not tanned but washed and smoothed on a wooden board to which it adhered with its own fat. When the skin dried, it was folded and sewn together with a strap of raw skin around the edge and tightened to form the shape of the shoe (Rahme, L. 2012). According to Sigfusson (2017), Icelandic history, right from the settlement of Iceland in the 9th century, has been interwoven with marine resources. Fish has been their main source of food and income and they still have their ancestor's spirit of finding usefulness in everything.

Fashion Education for Sustainability



Figure 1. Traditional Icelandic shoes made out of Cow leather (left) and wolf fish skin (right) lined with knitted wool. Photographer: Nathalie Malric.

This research fits in to our broader commitment to sustainable fashion through raising awareness of new raw materials for fashion informed by aboriginal ancestral practices. The research provides us with the opportunity to change how fashion is taught in higher education. Furthermore, it will promote the integration of sustainable design thinking into the fashion curriculum. We believe, as educators we have the responsibility to integrate sustainable design thinking into our whole practice, from the sourcing of raw materials to understanding the impact of those materials on people and the planet, right back to the beginning of the supply chain. Drawing upon indigenous knowledge on raw material processes is crucial to helping fashion students to stay at the cutting edge of sustainable innovation. The research proposes an innovative approach to teaching fashion sustainability, through the creation and delivery of a fish skin educational programme where students have engaged in a knowledge-based project creating new kinds of collaboration amongst themselves and the craftsperson.

Description of activity

Project creation

The Fish Leather Craftsmanship workshop was organised by Elisa Palomino and Katrín María Káradóttir and taught by Lotta Rhame in collaboration with Atlantic Leather tannery. The authors designed a workshop encouraging Artic design students to produce fish leather designs using traditional skills built over generations by Arctic indigenous peoples. The aim was developing sustainable design within the Arctic traditional ways of life in areas with a history of fish skin leather production such as Iceland, Sweden, Finland and Denmark. Preserving and using fish skin cultural heritage and strengthening networking activity.

Recruitment

Author 1 and 2 were interested to develop an immersive experiential learning process as a practical educational model of sustainability in action. Author 1 and 2 engaged with partners from Iceland University of the Arts, Royal Danish Academy of Arts, Boras University, Aalto University and Central Saint Martins to recruit students from their universities willing to participate in the workshop to explore further alternative sustainable fashion materials such as fish skin. A total of 10 students from universities in the circumpolar area (Iceland, Denmark, Sweden, Finland) and UK benefited from the workshop, author 3, a Swedish craftsperson delivered the workshop, shared Sami traditional fish skin tanning methods and passed down the endangered craft to the next generation of Nordic students.



Figure 2. Visit to Atlantic Leather fish skin tannery. Photographer: Nathalie Malric.
Workshop location

The workshop took place in Sauðárkrúkur, Iceland, combining the traditional knowledge on fish skin tanning with the technological progress of Icelandic tannery Atlantic Leather, which has been turning local fish skin into highly sustainable leather since 1994.

Workshop programme

The programme included a preparation, implementation, evaluation and a follow-up phase. Students learnt traditional fish skin handcraft heritage to integrate into their fashion practice. The workshop was 5 days long and included:

- Sustainability background Introduction
- Lectures on historical fish skin artefacts in international museums
- Visit to Atlantic Leather fish skin tannery
- Visit to the local textile museum
- Traditional fish skin tanning and dyeing methods
- Sketchbook development



Figure 3. Sketchbook development. Photographer: Nathalie Malric

Fish skin tanning

Lotta Rhame worked with students and tutors to create and experiment around tanning fish skin. We scraped two skins each with traditional and contemporary scraping tools in order to remove any residual flesh that would potentially rot. In order to soften the skins, we used a variety of tools that Lotta had been brought from Sweden, ranging from handmade wooden implements to the jaw of a moose. Whilst scraping the skins we explored the different layers and thickness we could achieve, in some cases removing even the top, two-tone layer. We used two different methods to tan the skins; one method included using a bark solution made from boiled sallow bark (the bark was collected in Dalarna, Sweden during the spring when the bark contains more tanning acid), and the other tanning method consisted on oil tanning using rape seed oil, egg yolk and soap.

In order to dye the fish skins, we boiled onion skins to make a yellow dye and cochineal to make a red dye. When the oil-tanned skins were dry and soft we put them in the solutions for 3-4 hours. We then rinsed them in water, dried them and softened them again. For the bark-tanned skins we mixed a strong bark solution with the onion skins and cochineal and when it was under 20 Celsius, we put the skins in. We left the skins in the liquid to dye overnight and re-oiled and softened them the next morning. In addition, Lotta Rhame, showed us how to make traditionally thread with the sinews and tissue of the fish and we learnt traditional sewing techniques. On the last day of the trip we held a critique with the students, and they all presented their skins, research and development from the trip.



Figure 4. Softening the fish skin with the jaw of a moose. Photographer: Nathalie Malric.

Conclusion

The paper demonstrates how relevant the Indigenous fish skin knowledge -in partnership with sustainable design strategies- can be to connect people to their culture, communities and the environment. Feedback from participants and craftsman suggests that the passing on the fish skin knowledge and skills was of great relevance to them as well as the immersive experience at the fish skin tannery Atlantic Leather. This fashion activity managed to inspire deeper relational connections amongst the students involved, the community and their environment. Working outside of the classroom can provoke a learning method that usually does not occur in the university campus. Students became the main players in realising resilience through the community-in-place.

The workshop seeks to inspire Academia involved in the development of sustainability and craftsmanship within their curriculums to implement this transformative teaching and learning experience in their own practice. The workshop methodologies reflected the geographical contrasts of the area. The harshness of the weather, the isolation and the limited availability of materials formed a unique source of creativity and inspiration for the students during the workshop. Fish skin was the only available material, urging students to think creatively and seek new design possibilities from fish skin. Eco-consciousness played a fundamental role in the students' designs using remnant materials. The traditional tanning processes we learnt, the use of environmental substances such as oils and bark, combined with modern state-of-the-art knowledge can provide a more environment friendly tanning industry.

The project provided a case study for working across Arctic Universities to develop their cultural identities and foster narratives of social sustainability. The cross disciplinary project has created a new structure to demonstrate how much the various Arctic communities have in common. This project recommends engagement with local communities and traditional fish skin knowledge holders— laying the ground work for an assessment that is co-produced by both traditional knowledge and fashion higher education.



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Figure 5. Fish skin tanning process. Photographer: Nathalie Malric.

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Design and Inuit Cultural Artifacts: at the Intersection of Ways of Knowing

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Abstract

As design programs increasingly evolve from discrete-object to relational systems orientations, there is opportunity to reevaluate core principles that inform design epistemologies. Indigenous traditional knowledge systems may provide frameworks for governing actions and behaviors that could guide designers to engage in more viable, sustainable and meaningful practices. Exploring *Inuit Qaujimajatuqangit* (*IQ*) or Inuit Traditional Knowledge as a framework for guiding design activity is the basis of a course that introduces students to a range of Inuit artifacts and cultural practices by considering them as objects of design and evidence of externalized knowledge. The course also introduces students to design as a way of knowing, as a process for devising human-made responses to environmental conditions, and as a category of informative and expressive artifacts, of which Inuit cultural objects are often exemplars. A key project is to redesign or modify an everyday object of significance to the student to make it more useful within the context and conditions of the student's daily life, while integrating *IQ* Principles. Students discovered a gap between what everyday objects are often purported to be versus the students' awareness of the implications of their design decisions owing to the *IQ* Principles. All students wanted to deepen their understanding of traditional knowledge and incorporate it into their practice.

Author keywords

Design epistemology; Inuit Traditional Knowledge; Systems-oriented design education; Design process; Dieter Rams.

Introduction

Design education programs have long nurtured the idea that design is at best a practice for good in the world, particularly in terms of making humans' lives better. Throughout the twentieth century making "good design" in response to functional and aesthetic "problems" was a worthy goal. For many educators, Modernism had determined what made "good design" and students designed objects as solutions towards that end. Lists such as Dieter Rams' "Ten Principles of Good Design" provide criteria by which designed objects have been evaluated for decades. The convergence of technologies and media in the twenty-first century means that students must navigate the parameters of ever-shifting relationships (Davis, 2018) between cultural and social systems.

As design education programs increasingly evolve from discrete-object to relational systems orientations, there is opportunity to reevaluate core principles that inform design epistemologies. Indigenous traditional knowledge systems such as *Inuit Qaujimajatuqangit* (IQ) or Inuit Traditional Knowledge, may provide frameworks for governing actions and behaviors that could guide designers to engage in more viable, sustainable and meaningful practices. Students explored this idea in a new online course in which design majors and non-majors alike devised design solutions inspired by and working within the IQ framework.

Criteria for Good Design

In the 1970s German industrial designer Dieter Rams, famously challenged himself to ensure that he made "good design." His manifesto, "10 Principles of Good Design," has inspired the designs of countless objects. Rams and his Principles have been experiencing a resurgence in popularity with the release of the documentary film, *Rams*, by Gary Hustwit and the retrospective book, "Ten Principles for Good Design: Dieter Rams" edited by Cees W. de Jong.

With the caveat that they be "shared accurately and fairly," (Creative Commons CC-BY-NC-ND 4.0 license) The Principles are:

1. Good design is innovative.
2. Good design makes a product useful.
3. Good design is aesthetic.
4. Good design makes a product understandable.
5. Good design is unobtrusive.
6. Good design is honest.
7. Good design is long-lasting.

8. Good design is thorough, down to the last detail.
9. Good design is environmentally friendly.
10. Good design is as little design as possible.

As an introduction to design as a practice concerned with outcomes, Rams' Principles are aspirational and thought-provoking for students eager to "design as much as possible." The Principles are benchmarks for the evaluation of designed objects, as suitable goals for designers' output. In Rams' explanations of his Ten Principles, human presence is implicit, both as designer and user, but the principles ultimately are about valuing the qualities of products instead of the actions and behaviors of designers. An object may be judged as not 'good' while the designer is absolved of responsibility. In recent interviews and articles, Rams discusses the need for design practice to be less object oriented and more cognizant of the larger systems in which design functions. He reflects:

"That's why, if I had something to do in this world again, I would not want to be a designer. Because I believe, in the future, it will be less important to have many things and more important to exercise care about where and how we live." (Hustwit, 2015)

This is not to vilify Rams or his legacy. This venerated designer calls on us to reconsider and reform our design practices. I suggest we open ourselves to influence from indigenous sources for better understanding of how to pursue meaningful and sustainable actions and behaviors, grounded in valuing where and how we live.

Inuit Traditional Knowledge

The Inuit of Arctic Canada have codified eight principles known as *Inuit Qaujimajatuqangit* (*IQ*) or Inuit Traditional Knowledge. The phrase is directly translated as "that which Inuit have always known to be true" and is recognized as a unified system of beliefs and knowledge characteristic of the Inuit culture (NCCAH, 2012). Inuk art historian, Heather Igloliorte, describes IQ Principles as "encompassing the complex matrix of Inuit environmental knowledge, societal values, cosmology, worldviews, and language." (Igloliorte, 2017) *Inuit Qaujimajatuqangit* has been documented by Inuit elders from across Nunavut and officially recognized by the Government of Nunavut as fundamental to cultural wellbeing within the context of the Inuit worldview.

The Guiding Principles of *Inuit Qaujimajatuqangit* (Government of Nunavut) are:

1. *Inuuqatigiitsiarniq*: Respecting others, relationships and caring for people
2. *Tunnganarniq*: Fostering good spirit by being open, welcoming and inclusive
3. *Pijitsirniq*: Serving and providing for family and/or community
4. *Aajiiqatigiinniq*: Decision making through discussion and consensus
5. *Pilimmakasarniq/Pijariuqsarniq*: Development of skills through practice, effort and action

6. *Piliriqatigiinniq/Ikajuqtigiinniq*: Working together for a common cause
7. *Qanuqtuurniq*: Being innovative and resourceful in seeking solutions
8. *Avatittinnik Kamatsiarniq*: Respect and care for the land, animals and the environment

Described as “knowledge embedded in process,” (NCCAH, 2012) the IQ Principles guide actions and ways of being in community that facilitate cultural well-being. The outcomes of those actions—cultural artifacts, whether physical, virtual, or performative, are then inherently aligned with the value system, thus more appropriate to the contexts from which they emerge.

This description of the IQ framework, and its affinity with the design process, inspired me to seek ways design could contribute to Inuit healing, progress and cultural wellbeing. I was motivated by the hope that introducing design as a language and process for externalizing knowledge, could contribute to cultural wellbeing in the form of student success in the public (Western, colonial) school setting. I finally recognized my approach as colonialist, albeit unintentional, and turned the question around. Could striving to work within the Guiding Principles of Inuit Traditional Knowledge inform and strengthen design practices and products that claim to have environmental, social, cultural, sustainability goals at their core?

Exploring the Intersection of Epistemologies

Exploring IQ Principles as a framework for guiding design activity provides a worthy challenge, as students discovered in Design and Inuit Cultural Artifacts, a course that introduces them to a range of Inuit artifacts and cultural practices for study as objects of design and evidence of externalized knowledge, of which traditional Inuit cultural objects are often exemplars. The course also introduces students to the field and practice of design as a way of knowing, as a process for devising human-made responses to environmental conditions, and as a category of informative and expressive artifacts embedded in larger social, cultural, and technological networks.

As a 2000-level, online, elective course open to non-design majors, offered in summer, it attracted students at all levels from across the university, but primarily third-year students in various art majors as well as design. Students across the university are eager for access to design courses, but usually lack the skills to engage in them meaningfully. Comprising written, visual and hands-on project components, the course allows students to demonstrate their learning in a range of ways while gaining appreciation for how design manifests knowledge.

A Note on Cultural Appropriation

The course is not about learning to design Inuit objects, or emulating cultural motifs. It begins with a module on cultural appropriation, an important issue in Canada in recent years given the diversity of its indigenous and immigrant populations, and the context of reconciliation. Cultural appropriation simply put is the taking from another culture without permission, often with a profit motive.

Inuk documentary filmmaker Alethea Arnaquq-Baril provides a more nuanced description of cultural appropriation as being grounded in a yearning for connection with culture and community (Vimeo, 2016). She challenges those who would adopt motifs, objects, or practices as their own, to examine their own community more deeply for the solution they seek. In so doing, the outcome will be more respectful and meaningful. Her idea resonated with the culturally diverse students in my course, many of whom understand first-hand having the output of one's culture appropriated, from objects, to food, to customs and ways of understanding that they encounter living in Canada.

Student Projects

A key assignment in the course is to redesign or modify an important everyday object to make it more useful to the student. Their design decisions need to reflect contexts and conditions of their daily lives, the systems in which the object operates.

Having been introduced to Inuit objects, and analyzed them through the lens of the IQ framework, the students then consider their own objects through that framework. It helps them identify and describe the shortcomings of the object as well as conceive ways to improve it.

The course comprises both design majors and non-majors. The projects are not evaluated for skills in execution, but for the students' ideas on how to modify their objects, their rationales for doing so, and their reflections on the results. I should note that the lack of emphasis on execution is antithetical to the Inuit perspective. Inuit elders expect mastery of skills from learners, as being necessary for survival (NCCAH). The foregrounding of ideas is in part due to the time constraints of the course, and its introductory scope. The three projects described below demonstrate the range and scale of the students' ideas.

Expert User Modification: Khaleel Jhungeer, hair trimmer

Khaleel is a professional barber while attending university. The object he modified is one of the best-selling men's electric hair trimmers used by barbers. Its primary fault is that the internal motor vibrates in the hand, causing the metal casing to get too hot for the user to handle effectively. Clearly the user community agrees that heat and vibration are significant problems because there is a specially designed modification on the market, a silicone sleeve that fits over the body of the trimmer and reduces vibration by holding the pieces of the body snugly together. The sleeve also protects the user's hand from the heat of the motor. However, the item is marketed merely as an option for personalizing one's trimmer, with a logo, for example. The other benefits are considered secondary features. The sleeve-as-solution has endless varieties, of colour, textures, embosses, but falls short of solving the problem.

With this assignment, the student felt he finally had agency to make the modification as he envisioned. He disassembled his trimmer and cut the metal body pieces with a hacksaw. Reassembled, there is now an opening at the top

of the casing that provides ventilation for the internal motor, reducing heat. The modified object is lighter and fits better in the user's hand. He reports that the vibration is reduced. The trimmer blades are now exposed, which looks dangerous to this lay person, but as the student reports, allows the professional to perfect his skill because the openness of the blade arrangement improves his sightlines so he can make straighter cuts.

Khaleel responded to the IQ framework by recognizing the role of the right tool in one's expertise and place in community.

"Cutting hair is not just a job. For me, it is caring for people and serving them as best as I can. A good haircut can change a person's mood and give them confidence. It is a therapeutic experience that can also foster great relationships between barber and client. When they leave with a smile on their face, that is what motivates me to keep learning and practicing my skills."

Invention from Tradition: Sonia Yosopov, portable clothes wringer

Having recently arrived in Canada, Sonia nostalgically describes her use of an old-fashioned laundry washtub and clothes wringer back in her home country. She now uses an electric washing machine, but refuses to use an electric dryer on both environmental and economic grounds, for energy savings, but also for the protection and longevity of her clothes.

For the assignment, Sonia conceived of a portable clothes wringer, suitable for home use, yet packable for easy travel. She proposed a suction mechanism to hold the wringer in place and suggested conducting user trials with lightweight but durable materials such as carbon fiber for the rollers used to squeeze the water from wet clothes.

Sonia's approach to addressing the IQ Principles was to demonstrate the implicit relationships between them. For her, there is satisfaction in having one's own portable wringer, to launder clothes with care whenever needed. The added benefits of being cost-effective and good for the environment emerge as proof of the appropriateness of the object. Her inversion of those values, positioning the traditional object as a site for innovation and skill development, and frugality as a luxury, reveals a savvy design mind with the potential to disrupt conventional systems.

Accidental Service Design: Emilia Sadowski, self-serve shampoo station

Frustrated by the range of sizes and variety of shapes of non-reusable plastic containers of haircare products, Emilia felt strongly that her project should respond to the IQ Principles about being 'innovative and resourceful in seeking solutions,' and 'fostering respect and care for the environment.' Drawing inspiration from both bulk food stores for their dispensing methods, and high-end boutiques for the experiences they offer, Emilia re-envisioned the deceptively simple experience of shopping for shampoo. She discovered for herself that shifting the emphasis from packaging (typically the designer's purview) to the larger context allows for more sustainable options for the

consumer. Emilia found that by considering the implications of one design decision after another on the entire system, she had conceived of a way to 'foster good spirit,' and 'serve and provide for the community' by making hair products available in an open, welcoming, customizable way. The experience as she envisions it, also allows for 'discussion and decision making' among the community of shoppers.

Emilia, a music major, essentially found her way into service design through her project. In her reflection paper, she writes:

"This was a fascinating process and I certainly understand how a designer might become 'obsessed' with a given project. The more thought I gave to the design, and the IQ Principles, the more particular I became when considering all aspects of the system, from the structure itself, location within a retailer, design of the package, and even the user experience in general. The endless design possibilities made for an incredible (if not slightly frustrating) experience!"

Additional Findings

Through written reflection, students revealed surprise in the gap between what everyday objects are purported to be versus the students' awareness of the implications of their design decisions. One student discovered that an item labeled 'environmentally friendly' was not actually so when he accounted for his actions in the use and disposal of it. The IQ Principles inspired him to pay more attention to the implications of his design decisions throughout the use cycle of his object. All students learned that designing according to a set of principles does not require one-to-one correspondence all the time, but that working within a framework meant to support cultural wellbeing leads to holistic and meaningful outcomes.

Many students, particularly those raised in Canada, expressed shame that they didn't already know about Inuit or other Indigenous Peoples of Canada. All students wanted to deepen their understanding of traditional knowledge and incorporate it into their lives.

Conclusion

Indigenous Peoples everywhere have traditional knowledge systems that describe and inform knowing, experiencing, and understanding, grounded in their cultures. Documented systems such as *Inuit Qaujimajatuqangit* are more accessible to people outside the culture than others, but all are based in relationship to the natural world (STAO & FNMIEAO). Design, with its basis in the artificial world might seem to be at odds with finding affinities in traditional knowledge. However, both share the desire to foster environmental, cultural, and socioeconomic sustainability. Inuit Traditional knowledge, with its systems orientation, in which all parts are integrated to sustain the wellbeing of the whole, is well suited to inform emerging design practices oriented towards addressing complexity. For students introduced to design as a discipline that considers artifacts of its output in relation to the networks of influences on them, epistemologies that reflect that practice are simply most appropriate.

Acknowledgments

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Niva to Nenets: The making of a road-movie as a strategy for inclusive knowledge sharing

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Abstract

Niva to Nenets is an interactive road-movie that questions gift-giving and other possible pitfalls along the proverbial road to decolonization. It is part of an artistic research project that explores how art-making can inquire, discuss and encourage decolonization processes. A road-trip from Belgium towards Arctic Russia in a Lada Niva facilitated conditions for interesting circumstances and conversations. To legitimize a focus on us-and-them dichotomies and on the approach of artists working with indigenous peoples, the premise of this road-movie is my intention to give my Niva to the Nenets. As a reindeer herding people in the north-west of Russia, the Nenets struggle from the effects of accelerated climate change, rapid modernization, and the impacts of oil- and gas exploration on their herding grounds. The idea of giving them an old car, despite the fact that the usefulness of this gift was confirmed by the Nenets organization Yasavey, gave entrance to the sharing of many opinions, concerns and other responses. These responses are recorded with GoPro-camera's, and, combined with recordings of the travel, form the content of an experimental documentary that balances between coherent storytelling and two basic conditions of decolonization: freedom of opinion and freedom of action.

Author keywords

Interactive storytelling; road-movie; knowledge sharing; participatory practices; decolonization processes; gift-giving.

Introduction

Niva to Nenets is a case study within my doctoral research project *Towards Togetherness: Probing as a Decolonizing Approach for Artistic Inquiry*, which was defended in 2018.¹ The concept design of the case study leans heavily on the main goal of the PhD project: to experiment with conditions for knowledge sharing through an artistic and media-technological approach. This experimental approach, which can be considered the working method,² unveiled both possibilities and burdens for the transfer of knowledge. In this practice based paper, I first share some insights from the followed path of knowledge sharing. Then the road-movie as a genre, beneficial conditions of travelling, and some reflections on the act of recording are discussed. Further I explain how and why I assembled interactive trails throughout a collection of recorded scenes. A focus on possible colonial conditions of media use clarifies the experimental narrative structure and leads to the concluding argument that preserving openness towards multiple perspectives and opinions while building a coherent story is a balancing act.

The path of knowledge sharing

In my art practice I search for artistic ways of sharing knowledge through new media use. I approach knowledge as a qualitative, unmaterialistic commodity. Knowledge can be tacit or formal, private or public, local or global. Memories, concerns, understandings, values, habits, expressions, skills and stories all contain knowledge. My art projects tend to mediate between people and/or between different kinds of knowledge. Therefore, I allow and encourage multiple viewpoints: first during the participatory practices that inquire for knowledge and second within the media use that communicates the outcomes of these practices. I am motivated by the idea that the act of expression and shared activity can build a bridge where people can meet in between worldviews. For the *Niva to Nenets* project, I wondered how a road-movie can create a path for sharing knowledge, as the foundation of this metaphorical bridge.

¹ The *Niva to Nenets* road-movie can be watched online at: www.nivatonenets.org.

² I believe it is necessary in practice-based research, in research *through* art instead of *about* art, to think *from* the practice. Therefore, in comparison to (most) scientific texts, my writing is more personal than formal, with lesser references, as it specifically departs and shares from my art practice instead of the arts in general.

Road-movie

According to Danesi's Dictionary of Media and Communication, a road-movie is a film genre in which the main characters leave home to travel from place to place, typically altering the perspective from their everyday lives (2015, p. 256). The protagonist often makes a mental journey as well, and is in search for something or undergoes important life-lessons. The *Niva to Nenets* project fits well within this genre, as it tells the story of my attempts to handle a decolonizing approach. In order to do so, I need to handle a stressful attitude, the wish for things to be perfect, and good but foolish intentions as I want to support an indigenous family by giving them an old car. Within the road-movie genre, the travel itself is often more important than the destination. Along the way, meetings, circumstances and other encounters challenge the protagonist and somehow changes him or her before the arrival. In *Niva to Nenets*, participating co-drivers and people I meet during public events in Belgium, the Netherlands, Denmark, Sweden and Finland³ respond to my intentions and influence the course of action by their concerns and advise. In the second half of the road-trip a tipping point is reached. I am no longer playing out the role of a benefactor when local people safeguard the more challenging parts of the travel. Instead, I am the one who is taken care of. When I finally arrive on the Yugorsky tundra, a peninsula below the Novaya Zemlya islands that can only be reached by helicopter, I am impressed by the words of the oldest man of the reindeer herding families that I visited. In response to my question if and how people of Western Europe can help him to continue his traditional livelihood, he states that they are not in need of anything as long as they can continue to have access to the land. By then, the Lada Niva is broken down for the third time. Remembering the urgent advice given to me during one of the public events, that I should not stick to my initial intentions against the wishes of the local people, I follow the strong request of Yasavey⁴ to ship the car back to Belgium. Sharing knowledge about and appreciation for the Nenets culture turned out to be the strongest gift that I was able to give.

Travelling to inquire

The long road-trip was an on-going experience that brought many challenges and opportunities for me to change, but to inquire for knowledge too. In order to emphasize the lived knowledge of people who experience challenges of decolonization on a daily basis, I invited specific people to travel parts of the trip with me. Cunera Buijs, who travelled with me from The Hague to Copenhagen, is curator Arctic regions at the Dutch National Museum of Ethnology and is involved in several repatriation projects. Kulunnguaq (Kulu) Petersen, a Greenlandic psychology student, travelled with me from

³ You can read more about the strategy of these public events, called *Picnic-Quizzes*, in my doctoral thesis at: www.towardstogetherness.org.

⁴ Yasavey (meaning *Guide who knows the terrain* in Nenets language) is the Nenets support organization of the Nenets Autonomous Okrug: www.yasavey.com.

Copenhagen to Stockholm together with the author Iben Mondrup who grew up in Greenland. They both experienced us-and-them dichotomies strongly, and were not shy to express their opinions on contemporary situations. Anna and Anders Sunna joined me from Stockholm to Mariehamn. Their Sami identity is strongly defended in Anders' art. Svetlana Usenyuk, a designer and researcher with a focus on co-creation and Nenets' transport vehicles, travelled with me from Helsinki to St. Petersburg. For the final part, from St. Petersburg to Naryan Mar, I hired Alexey Platova to drive me. Alexey is Komi and married to a Nenet. The project's schedule created an opportunity to spend approximately three days with each participating co-driver, instead of only a fraction of that amount of time that is usually provided for a regular interview. While travelling together, shared activities such as unpacking and repacking the car added to a temporary feeling of togetherness (see Figure 1). The sun, appealing landscapes, the distance from home, and of course the act of traveling brought us in a holiday mood that shifted the perspective from our everyday lives.



Figure 1. Re-packing the Niva with Anders Sunna after a public event in Stockholm. I experienced such activities as bonding and beneficial to temporary feelings of togetherness.

Recording to share

Media use can be put in practice to the benefit of decolonization processes, as it can support knowledge sharing. Fay Ginsburg (2002) underlines how both indigenous media and ethnographic film intend to communicate about social or collective identity in order to mediate across gaps of space, time, knowledge,

and prejudice. Mediation, she defines from the American College Dictionary, is “to act between parties to effect an understanding, compromise, reconciliation” (p. 216). But if one aims to decolonize his or her actions, it is important to avoid power imbalances during all stages and actions. Thus, I tried to give the participants as much agency over the recordings as I had. A maximum of five GoPro’s were attached inside the car to record our conversations from different view-angles, while two cameras were attached on the roof rack for recording the exterior. During the public events, the participants handled the GoPro’s themselves (see Figure 2). Although much footage turned too wobbling or otherwise too inferior to use, I prefer this kind of recording for future projects. Besides the fact that the recording itself becomes more inclusive, I prefer not to interfere the present moment with the presence of big camera’s and non-participating people who operate them.



Figure 2. GoPro's on a stick in use by the participants of the public event in The Hague.

The fact that I was recording a movie gave people the possibility to share and transfer knowledge about their culture. While we were waiting to board the ferry towards the Åland archipelago, Anders told me the reason why he and his wife agreed to participate in the project: "Maybe we get our voice heard. Because some things are going on in Sweden and it doesn't get out to the rest of the people. About our problems and stuff like that".

For the Nenets in Russia too, the presence of a Westerner with recording cameras created the possibility to have their voice heard and their culture known. For example, I was invited to spend two days with the performance group Ханебцё (pronounced *Ghanebtsjeh*, means snow owl in Nenets language) on the tundra close to Naryan Mar, to record their rehearsals. Ханебцё is a group of mainly women, under the guidance of Ludmilla Bouligina, that promotes the Nenets culture through their performances.

There was not always an interpreter available during our recordings, but on some occasions I considered this beneficial as it created an open canvas for this group. With almost no guidance or questioning, they freely chose what and how they wanted to share in front of the cameras. For example, they showed and explained their traditional clothing, sung Nenets songs and performed local stories. Ludmilla appreciated the possibility to share knowledge of Nenets culture through the medium of film. "The more people know about our culture, the better," she said. Alexander Belugin, director of the Nenets organisation Yasavey, confirmed that a broader understanding of the Nenets culture contributes to the availability of the tundra for the reindeer and the herders. Media attention can thus support the continuation of their livelihood and culture.

Interactive trails

More than 350 hours of film footage was recorded during the road-trip. Besides the contributions of Ханебцё, these recordings include explanations and frustrations of Anna and Anders Sunna about the contemporary situation for the reindeer herding Sami in Sweden, an introduction to the Sami gift-giving system (*Láhi*) by one of the participants of the public events, experiences from the colonial school system on Greenland by Kulu Petersen and Iben Mondrup, and much, much more. As the improbability of watching everything motivates exploration, the sheer volume of selected recordings was deliberately kept extensive in an ultimate selection of still more than 200 meaningful scenes. These scenes are represented in the shape of a medley, as a cloud of slightly moving colourful dots (see Figure 3). From here, each colour leads to a storyline with a specific focus: the yellow line discusses issues related to gift-giving and decolonization processes (see Figure 4), the blue line tells about the Niva, the green line tells about the Nenets, the purple line shows the changing landscapes through musical scenes, and the red line focuses on my personal adventure. Some scenes are part of two storylines, enabling viewers to switch from one line to another (see Figure 5).

In order to follow your own trail throughout the extended collection of scenes, it is possible to choose a storyline, the scenes within this storyline you want to watch, and in which order. In case the scene was recorded with multiple cameras, you can also switch between viewpoints during playback (see Figure 6). You can activate an informational layer on top of the screening, which shows a map of the location of recording, GPS coordinates, the date, time and a length, and a short description of the scene (see Figure 7). Altogether, this interactive narrative structure enable viewers to explore the collection of scenes for five minutes, or up to five hours.

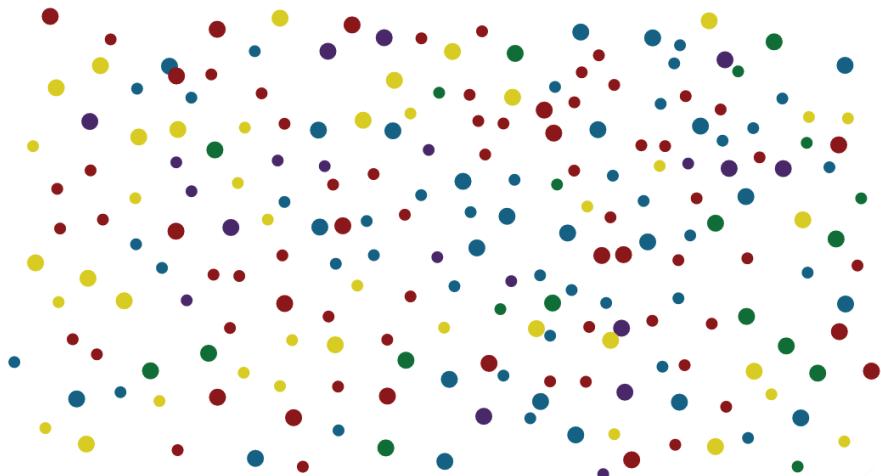


Figure 3. All scenes within the *Niva to Nenets* road-movie are represented as coloured dots in a cloud. Clicking on a yellow dot will automatically open the represented scene within the yellow storyline, a blue dot within the blue storyline, and so forth. Each storyline has its own focus: the yellow line discusses issues related to gift-giving and decolonization processes, the blue line tells about the Niva, the green line tells about the Nenets, the purple line shows the changing landscapes through musical scenes, and the red line focuses on my personal adventure.

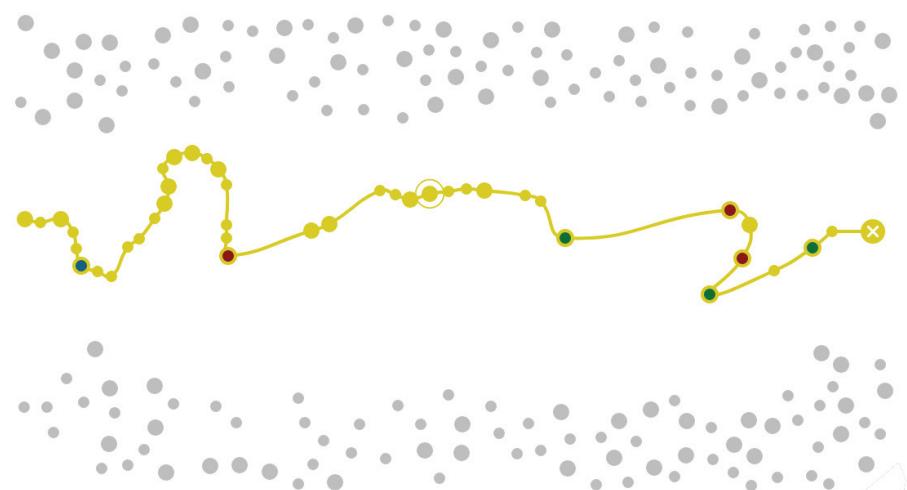


Figure 4. The scenes that focus on the discussed issues are grouped within the yellow storyline. The dots that represent inactive scenes move aside and loose there colour. Dots that are part of two storylines have two colours. After the playback of a scene, one can choose to open another scene within the storyline, to close the storyline to go back to the cloud, or to wait until the system automatically opens the next scene in order.

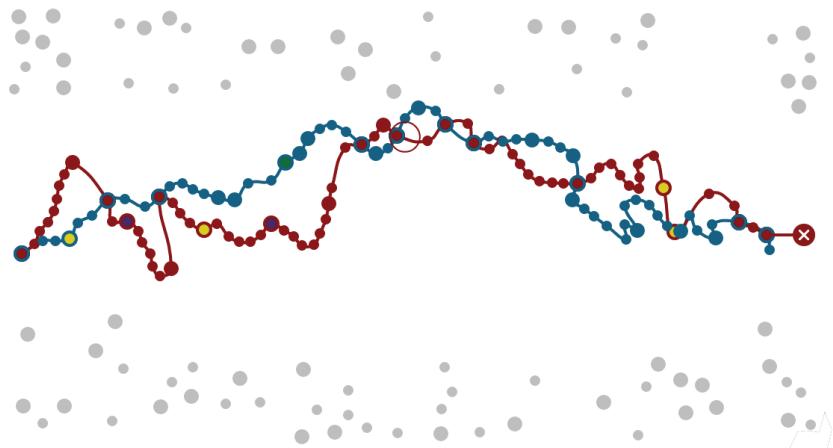


Figure 5. If one scene is part of two storylines, both storylines will become visible after playback. It is now possible to switch from one line to another. Alternatively, one can close the active storylines to go back to the cloud and open another one from there.



Figure 6. In case the scene was recorded with multiple cameras, you can switch between viewpoints during playback. A selected small viewpoint will then change position with the bigger, central spot. In this scene within the yellow storyline (which focusses on the discussed issues), Anders Sunna talks about racism in Sweden.



Figure 7. The navigation design of the *Niva to Nenets* road-movie enables you to activate an informal layer on top of the screening. This layer contains a map of the location of recording, GPS coordinates, the date, time and length, and a short description of the scene. It also gives information about the active storyline and, in case co-drivers are present, a short introduction.

In media use, I believe, one should try to avoid colonizing influences during the handling of recorded footage. Even unconsciously, many aspects of the dominating Western worldview can influence the movie-making during montage, for example in storytelling, as David MacDougall (1987) pointed out: "The dominant conflict structure of Western fictional narratives, and the didacticism of much of Western documentary, may be at odds with traditional modes of discourse. The division into fiction and documentary may itself be subversive. Or differences may arise in the convictions of narrative and imagery" (p.58). The *Niva to Nenets* project searched for a representation of the recordings that bypasses traditional modes of discourse, which are, according to MacDougall (1987), possibly colonial. A viewers' understanding arises from a relational network in which different bits of knowledge connect and validate one another. In film montage this is known as the Kuleshov effect that proves how reflective thought grows out of the interaction between sequential shots. Dewey (2012/1910) states that "reflection involves not simply a sequence of ideas, but a consequence — a consecutive ordering in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessors" (p. 2). As the order of scenes influences the reflective thought of the viewer, this consequently might be a colonial thought in case the editor acts from the dominating Western worldview.

In an attempt to bypass the consequences of a fixed order of scenes, the narrative structure of the road-movie motivates viewers to choose their own order of viewing and literally change perspective. This 'freedom of action' does not merely motivates 'freedom of opinion', but it tries to avoid (unconscious)

opinion-making from montage. However, I needed to give viewers guidance to keep their explorations of the recorded material meaningful. Just presenting the enormous amount of footage, in the condition as it was brought home from Russia, would make no sense. Similar to montage, I therefore needed to decide which recordings would become scenes, and which of these scenes could be grouped to share for example an aim on the Niva, the Nenets, or the issues that were discussed. As some scenes turned relevant in two groups, they were given two colours within the representation of dots and (story)lines, which is described above. In result, they get more attention and are thus viewed more often. To guide the viewers a bit more, I indicated a scale: dots representing scenes that I find more meaningful are a bit bigger. Although the aim on exploration empathises a freedom of action, this freedom is limited in order to give some guidance. As soon as one chooses to click on one dot instead of another, the activated storyline insurmountably leaves out others. In interactive storytelling, I therefore believe, one has to find a balance between freedom of action on the one hand, and a guided storytelling experience on the other. The difficulty lies within the fact that one does not design for just one audience: some people prefer more influence of their actions than others. Thus, one should not guide too stringent, but not too loose either.

Conclusion

In an attempt to contribute to decolonization processes, the *Niva to Nenets* artistic research project investigated some aspects and possibilities of media use. I explored how the making of a road-movie can be inclusive to a broad spectrum of opinions and worldviews. The recording stage, which included the act of travelling, was supportive to the sharing of knowledge. The premise of the road-movie gave enough meaning and direction to the conversations while the approach stayed open towards discordant viewpoints. This resulted in a myriad of responses, which were sometimes contradicting. The editing stage, which included the selecting and arranging of scenes from the bulk amount of recordings, unveiled the importance to find a balance between exploration and narration. A navigational ‘freedom of action’ was consciously crafted to counterbalance the constraints of the necessary guidance to ensure a narrative experience. In an attempt to safeguard enough ‘freedom of opinion’, I tried not to force my way of seeing things upon the viewers while building an interface that allows viewers to define their own translation throughout the represented reality.

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3. Cross-disciplinary Paths for Art, Design and Media I

Cross-disciplinary collaborations between different fields are growing and becoming increasingly important. What kind of cross-disciplinary practice, research and other collaborations are taking place in art, design and media? How can cross-disciplinary collaborations in art, design and media build resilience? This track invites presentations and discussions on cross-disciplinary projects and collaborations that will come about around the campfire at Cumulus Rovaniemi.

Academic Papers

The role of storytelling in art museum experiences

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Abstract

Art, design and media have a common dimension on which this article aims to shed light: Experience. Within this topic, the article suggests storytelling as a possibility for art museum experiences and present a study on possible impacts of storytelling to enhance educational, aesthetic, social and transformative aspects of artwork experience for novice visitors. The first part of the article discusses concepts of storytelling to enhance novices' experience of art, based on a literature review. The second part gives suggestions developed in a collaboration project with the national museum for decorative arts and design (NKIM) to improve the museum experience for its novice visitors. The authors will here argue for the value and challenges of storytelling in museums and present a crime mystery storytelling concept, which was prototyped and tested during the project. While the concept was well received by most participants, test results showed that some participants found the prototype too steering regarding their museum experience. Findings from the study indicate that storytelling is of cross-disciplinary interest for art, design and media in improving experiences, communication and interaction, by providing a common ground for laypeople and experts. Storytelling also has a huge potential to give novices the context they need to experience art. Further, it may contribute to generate long-lasting memories and possibly relationships with artworks. However, storytelling comes with certain challenges, which are discussed in the final section of the article.

Author keywords

Aesthetic experiences; museums; storytelling; co-design

Introduction

Newer literature claims that museums recently started to see themselves not only as conservators of objects, but also as visitor-centred sites of experiences (Falk & Dierking, 2013; Samis & Michaelson, 2016). For example, art museums acknowledge that artworks should be made accessible for everyone, and that people should have meaningful encounters with art works (Foreman-Wernet & Dervin, 2016). However, many people find art exhibitions intimidating and many museums struggle to attract non-experts. The traditional ‘white cube’ exhibition interior displaying artworks on white, neutral walls, without additional information and context seems insufficient to give novice visitors a meaningful museum experience.

Recognizing that visitors want encounters with art, many museums look closer at possibilities of how art experiences can become valuable and memorable for the visitor, and the museum a place where people do not only go to learn about or look at art, but to include art in their everyday social and intellectual life (Falk & Dierking, 2013). The film *Loving Vincent* (Kobiela & Welchman, 2017), a hand-painted biographical film about the painter Vincent Van Gogh, is a recent example of making art accessible through storytelling. The film displays many of Van Gogh’s famous paintings, dynamically woven into a crime story and reached a wide audience after its release to theatres world wide.

This article assumes that storytelling provides possibilities for enhanced museum experience, because stories can inform and educate in an entertaining manner, they can evoke emotions and make visitors connect with exhibited artworks and artefacts. Based on this assumption, the article will examine the role and value of stories and storytelling in on-site art museum experiences through a review of literature gathered mostly from research journals within museum experience design, museum and visitor studies, art curatorship and education, and conference proceedings from Museums and the Web. The article will also draw findings from a project on storytelling in museums (Sørnes & Molaug, 2018) conducted in 2018 in collaboration with the national museum for decorative arts and design (NKIM) in Norway. The objective is to pinpoint art museums’ challenges in engaging young novice visitors and to indicate how storytelling approaches may help in meeting them.

Key terms and concepts

Museum visitor experience

Summarizing research on museum experience Packer and Ballantyne define it as ‘an individual’s immediate or ongoing, subjective and personal response to an activity, setting or event outside of their usual environment’ (2016, p. 133). Their definition is embedded in a multifaceted model of ten possible components of museum experiences: Physical; sensory; restorative; intro-spective; transformative; hedonic; emotional; relational; spiritual; and cognitive (*Ibid.*, p. 136). According to other authors, museum experiences depend on complex system perceptions comprising myriads of factors and a continually shifting interaction between the visitor’s personal context, the physical context of the museum and the socio-cultural context (Falk & Dierking, 2013, p. 26).

The whole visit to a museum can be interpreted as a chain of experiences, each shaping interpretation of the next and impacting the ‘visitor’s takeaway impressions’ (Packer & Ballantyne, 2016). A ‘visitor journey’ from a service design perspective, spans from deciding and preparing to go to the museum, to the physical or virtual visit, and finally to interpreting and digesting the visit afterwards. If the goal is to create long-term relationships with visitors to keep them returning to the museum, one may expand the idea of the visitor journey to an on-going continuum with physical visits along the way.

Novice visitors

This article refers to novice visitors as persons that do go to museums, but that are *relative novices* or amateurs in viewing, interpreting and experiencing art. It does not look into marketing concerns nor attempt to determine whether storytelling can help to attract new audiences of non-visitors.

Storytelling in museums

A story is a narrative of events. Storytelling is the way the story is told (Wong, 2015), affecting how it is experienced: it sets a spatial setting, directs attention to certain parts, and leaves out others. Within psychology, stories are understood to be closely connected to human experience, and an important part of how humans learn, think and feel (Bruner, 1990). This applies not only for instance when bringing young children into a culture (Madej, 2008), but also for adults to continue to shape and define their identity (Bedford, 2014). ‘Storytelling’ can refer in a narrow sense to oral storytelling, a two-way interaction between teller and listener, where the story emerges from cooperation between the involved parts (National Storytelling Network, 2018). This article refers to storytelling as including other techniques and media as well.

In art museums, the ‘storytelling’ term is often used more broadly to cover the communication of stories about a collection of objects, as in (Wyman, Smith, Meyers, & Godfrey, 2011), as an addition to direct delivery of facts. Traditionally it is applied to help to give objects context and meaning in the mind of the museum visitor, through guided tours, theatre reenactments and written information on physical exhibits. Museum scholar Leslie Bedford makes a distinction between stories used to package exhibition content into a sequence, and compelling ‘true narratives’ that evoke the visitor’s emotions and imagination (Bedford, 2014).

A common structure for stories derived from western literature is a linear plot, with a pattern of rising and falling tension that facilitates emotional compassion with the characters (Lupton, 2017; Zak, 2015). The traditional or classical narrative arc often labelled ‘Gustav Freytag’s triangle’, is a sequence of events with a beginning, middle and end. It consists of the following phases: exposition; rising action; climax; falling action; and denouement (Lupton, 2017; Zak, 2015). Another storytelling model is the ‘hero’s journey’, which can be recognized in myths and legends (*Ibid.*). But stories may also take a less linear and more spatial form (Madej, 2008; Wong, 2015). If another principle than time is used to give order to a story, then this must be indicated to the reader,

to avoid loss of coherence (Wong, 2015). Both physical and digital spaces are experimented with for their narrative capacities, for instance to tell stories from several perspectives at once, through a range of media and devices, or to allow the visitor to influence the story herself (Wong, 2015).

Art museum experience

Art museums today

Originally, public museums were seen as educational institutions, playing an important role in creating and disseminating knowledge (Bedford, 2014; Bennett, 2007; Sayers, 2011). In the 1920s, art museums start to focus more on collecting and protecting objects and were perceived as elitist temples of the arts (Sayers, 2011), rather than as democratic centres of learning (Bennett, 2007). Accordingly, art exhibits have been governed by the modernist aesthetic ideal of clean and functional 'white cube' interiors to display art since the 1930s. The white cube aims to invite contemplation and immersion without any distraction of additional information and context (Giebelhausen, 2007; Samis & Michaelson, 2016).

The recent years have seen a shift back towards visitor-centred principles, (Falk & Dierking, 2013; Samis & Michaelson, 2016), supported by visitor studies and a wider range of studies like psychology, anthropology and design (Bedford, 2014). Already in 1977, the anthropologist Graburn stated that museums should satisfy three (possibly overlapping) human experiential needs: The *associational*, which is 'an excuse or focus for a social occasion' where the museum is analogous to other leisure sites; the *educational*, which is the need to learn and expand one's horizons; and the *reverential*, which is the need for 'a personal experience with something higher, more sacred and out of the ordinary than home and work are able to supply' (Graburn, 1977, p. 3). According to Falk and Dierking (2016), these needs seem to reflect the main categories of reasons art museum visitors report when asked the question 'Why did you come here today?'. Because of their significance, this article employs them as onset to examine and discuss art museum experiences.

Generally, art museums reckon themselves as sites of leisure activities for everyone, parts of the 'experience economy' where experiences are measured in terms of memories (Pine and Gilmore, 1999). They acknowledge that they must understand and cater for a range of audiences, and build long-term relationships to keep visitors returning (Falk & Dierking, 2013).

Learning experiences

Most art museums subscribe to a constructivist view, which assumes that people learn best through active involvement and constructing their own understanding in meaningful ways (Foreman-Wernet & Dervin, 2006). Psychological and visitor studies show that increased knowledge and familiarity with art leads to increased interest and liking (*Ibid.*). This suggests that information and interpretation provided on the novice's level will lead her to revisit later on, gradually building cultural competence. Art museum educator Sayers (2011) recognizes two different approaches to learning in art museums: a scholarly

paradigm, where the goal is to reach an objective truth; the other emancipatory, where negotiating subjective meanings together is more important.

In addition to in-person guides, many museums use technology in form of audio guides or websites to provide context that the white cube ideal omits. Michaelson and Samis (2016) make a point that most visitors choose not to use such aids and that they might be a pretence for museums that do not want to change their ways. They suggest that the exhibition itself must provide context about objects right as visitors stand in front of them (*Ibid.*).

Social experiences

Visitors studies indicate that having a companion during arts museum visits plays a big role for the quality of the museum experience (Debenedetti, 2003). An important motivation for going to the museum in the first place, especially for non-experts, is sharing a social time together with others (Falk & Dierking, 2013). According to Debenedetti, visiting together with friends or family is shaped by and fulfils several needs. Among others, *mutual enrichment*, where visitors position themselves in uncertain situations and clarify their understanding through verbal exchange is mentioned here. Further, *recreation*, where the presence of family and friends allows visitors to relax and have fun; *reassurance*, where discomfort is eased by companions' emotional support; *Prestige*, where the visitor's social standing within the group is increased through discussion; and *transmission of knowledge*, usually between parents and children (Debenedetti, 2003, pp. 56-57). The study suggests that experts rather walk solely and experience deep bonds with the artwork, while novice visitors talk to each other to reflect upon and construct meaning of the artworks.

For designing satisfying art museum experiences, frameworks such as Falk and Dierking's contexts for learning (2006), or Packer and Ballantyne's museum experience facets (2016) might be useful. Learning experiences in art museums are influenced by the museum's approach to art education – either according to the overall scholarly or emancipatory schools. Either way, people attend museums not merely to learn. They also seek experiences out of the ordinary, together with others. When designing for novice museum visitors, professionals should keep in mind their social needs and motivations related to the visit, as they may be greater than the experts'.

Stories and storytelling in art museum experience

Advocates of storytelling in museums sometimes refer to the psychological disposition that humans make sense of the world and their lives through narratives, and, that information structured as a narrative might be easier to remember (Bedford, 2001; Bruner, 1990). In the context of an art exhibition, a narrative told by the museum to visitors may direct attention to specific artworks, and connect information about them to a meaningful sequence that is easier to remember. Such a narrative can be told through different types of media, perhaps most commonly textually, orally or visually. It can also be distributed throughout the room in a spatial and less sequential manner or as digital storytelling experience.

Sequentiality is one of the main characteristics of stories – without order, the components of a story fail to make sense (Bruner, 1990; Wong, 2015). The tendency to think of narrative as one cohesive linear story that represents ‘the truth’ is the background for some scepticism toward storytelling in museums (Wong, 2015). Sceptics argue that stories may lead to overly dominant, subjective, didactic and unnuanced renderings of events (Macleod, Hanks, & Hale, 2012; Wong, 2015). Wong disagrees and suggests that one can avoid this by making more use of the spatial dimension of stories as well as the sequential, to tell the story from several different perspectives at once (Wong, 2015).

Other critics argue that stories demand an emotional, rather than intellectual response, and that what you remember from stories is how they made you feel, rather than the content. But emotions can also be symptoms of interpretation or understanding that deviates from the known and expected – doors into insight and personal development. Proponents of storytelling in museums emphasise its power to make visitors connect to the content, motivate them to want to see what happens next, and make the learning experience more entertaining (Wong, 2015).

Storytelling to enhance aesthetic and social experience

Museums might also apply storytelling to stimulate a switching in attentive modes that is, according to Kesner (2006), important for aesthetic experience. While there are few examples of such practices, it seems likely that stories that stimulate interpretation and imagination may also stimulate a kind of ‘wandering viewing’ that makes visitors plunge into the artwork and lead to an immersive experience. At the same time, encouraging this way of experiencing artworks might lead visitors’ minds to generate more stories by themselves while viewing other objects. Notably, some might view such effects as distracting to ‘good viewing’.

Ioannidis and Vayanou (2017) propose a generic storytelling game approach to achieve engaging group activities within art museums and thus cater to the social motivations of coming to the museum. Generic storytelling games are games where players make up stories about something, and then tell the story to the rest of the group (*Ibid.*). During a storytelling game, players are particularly engaged in the triggering story elements. In order to construct a story about an object, they carefully observe and reflect on its possible meanings, uses and perspectives (*Ibid.*). When telling the story to the group, personal viewpoints are shared, which leads to discussion and further enhances the players’ connections to story elements.

Immersive storytelling for memorable experiences

The storytelling applications covered thus far have aimed mostly to enhance educational, social and aesthetic experiences in art museums. From an experience economy perspective, when people buy an experience, they pay to spend time enjoying memorable events (Pine & Gilmore, 1999). Storytelling approaches that make use of the whole exhibition space, may make art museums more memorable by offering deeper and more immersive experiences than expected. A common way to do this is to create a room or space related to

or depicted in an artwork. This way, visitors can be inside, or even part of, the story event. Storytelling might be done by live actors acting out scenes like in a play, or by 'object theatre' where objects tell stories themselves.

The most technologically upfront initiatives use digital technology to create immersive storytelling experiences, much like video games where the story is generated according to the player's choices. Within this category is the completely virtual museum only experienced in VR, but also use of digital technology to create immersive storytelling experiences within the museum (Carrozzino, Colombo, Tecchia, Evangelista, & Bergamasco, 2018; Urban, 2007).

Design of a crime mystery storytelling activity

In the autumn of 2018 two of the authors cooperated on a service design project with The National Museum of Decorative Arts and Design in Trondheim (NKIM), Norway (Sirnes & Molaug, 2018). The aim of the project was to explore the museum experience for young adult novice visitors at NKIM and develop a concept which improves the experience for this target group. Several observation methods were used in the exploratory phase of the project, including surveys, interviews and direct observation. Through these methods it was discovered that the exhibitions at the museum were influenced by the 'white cube' ideal, and that the artefacts in general were not exhibited with sufficient context that the novice visitors could make a meaningful connection to them (Sirnes & Molaug, 2018). Through a co-design process with the employees at NKIM, the project team generated ideas on how one might provide context for novice visitors. This eventually lead to the concept of 'The crime mystery'. Among other things, this concept was elected because it utilized storytelling in a way that both enables learning and a social experience for the users.

'The crime mystery' concept was rapidly prototyped using the content management system *Wordpress*. The prototype contains both digital and physical content and components, both on the website and in the museum. The crime mystery activity begins when the users find a letter with a crosswords puzzle in an empty showcase, left behind by 'The thief'. When solved, the puzzle will reveal the location of a stolen diamond necklace, hidden by the thief somewhere in the exhibition. To solve the mystery, users must both find the necklace and figure out who stole it. They must 'question' four suspects – virtual employees of the museum within the website, described with text, images and audio narratives. The employees are located at different time periods throughout the exhibition: the renaissance, the baroque, the rococo and Art Nouveau. By 'talking' to the employees the users may learn about a selection of the exhibited objects and the time period in which they belong, enabling them to answer the crossword questions. The users can also listen or read the employees' statements about their whereabouts around the time of the robbery to figure out who stole the necklace.

MYSTERY AT THE MUSEUM MENU

Go to Roar Bakken

Roar is the receptionist at the museum. You'll find him in the first part of the design history exhibition in the cellar, to the left after entering.



[Yes, I'm here! Let me speak with roar.](#)

[Return to «Introduction to the investigation»](#)

MYSTERY AT THE MUSEUM MENU

A chat with Roar in the renaissance

What would you like to ask Roar?



[Could you describe what happened the last two hours before the necklace was stolen?](#)

[The thief writes that «only the worthy» can find the necklace, so I need to learn more of the history behind the artefacts. Could you help me?](#)

[Return to «Go to Roar Bakken»](#)

[Return to «Introduction to the investigation»](#)

Figure 1. Screenshots from the website part of the prototype, as shown on a mobile phone. The page to the left, "Go to Roar Bakken", guides the users towards where this virtual employee is in the exhibition. The page to the right, "A chat with Roar in the renaissance", shows a drawing of Roar, and gives the user the choice of two questions to ask him.

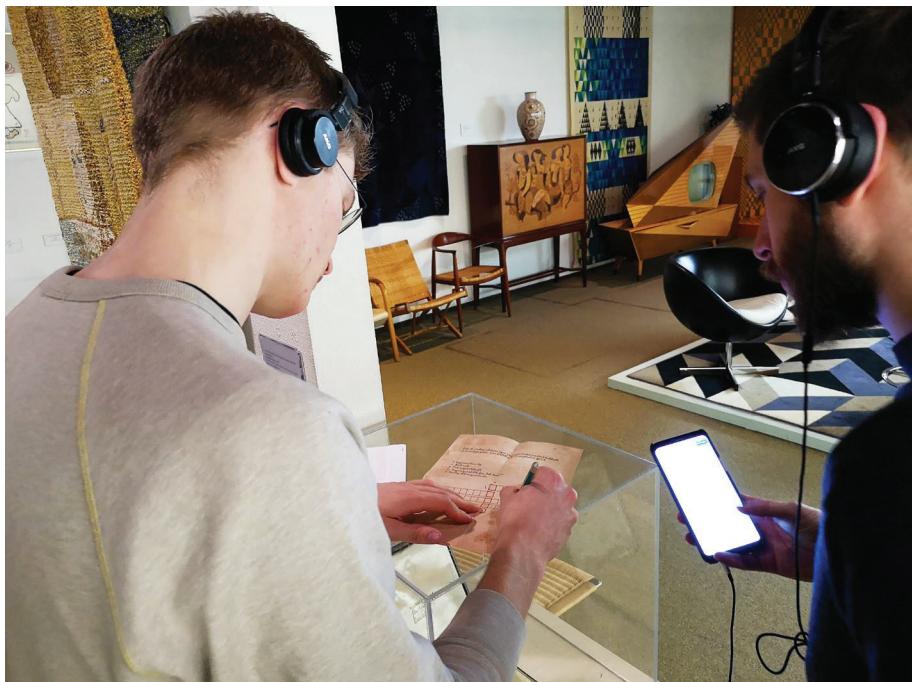


Figure 2. The prototype included both a paper based crossword puzzle and a website.

Six people in the target group were invited to test the prototype, which led to several findings. Most of the test users enjoyed the experience and found it both entertaining and informative – the former being the most important for them. The theme of the crime mystery appealed to them, they found the pictures of the characters to be helpful, and they enjoyed listening to the voice actors. Each test lasted about 30-45 minutes, but the users who enjoyed the experience stated that they could have played for longer. However, some test users also said that they found the prototype a bit childish, and that they would have preferred to use a traditional audio guide instead. In general, all of the users wanted more available choices within the prototype, for instance the choice to read up on an object they found interesting. The prototype was relatively linear, but in further iterations it could have been improved by giving the users more freedom to choose their own path, through for instance letting the users play different roles within a detective team. The users also commented that it was challenging to use both their phones and a sheet of paper containing the crossword puzzle at the same time. The users, who tested the prototype in groups of two, got no directions on whether they should stick together or listen to the employees separately, but all of them decided to stick together (Sirnes & Molaug, 2018).

'The crime mystery' concept has some positive aspects, but also a few drawbacks. The complex nature of a crime mystery makes it harder for visitor to make the stories themselves. Additionally, one cannot interact physically with the objects in a museum, and this restricts the concept somewhat. In addition

to crime stories one should therefore explore other types of storytelling to give context for novice visitors.

Challenges with storytelling

There are both practical and principal challenges in implementing storytelling in art museums. Many relate to professionals' and visitors' conceptions of what roles art museums should play in society, and how they should do it. Most of the practical challenges are consequences of the fact that storytelling in art museums is a fairly novel practice. This relates to e.g. the lack of competence in storytelling; the fact that art museum buildings are built for the white cube experience, not immersive story oriented experiences; and a lack of easily available tools to manage non-linear or immersive storytelling in museum spaces (Stein, 2016). Additionally, large museums naturally have greater resources to implement novel technology than smaller ones.

While many professionals hold that playful and informal learning, interactivity and immersive experiences is the future of museums (Westin, 2011), others do not think entertainment fits within a museum experience at all (Jones, 2017). Arguments might resemble those against the use of technology and new media within museums, which sceptics see as '[...] threatening the authenticity of the artifact, the authority of traditional sources of knowledge, and as vulgarizing museums, turning them into commercialized sites for "edutainment".' (Henning, 2007, p. 302). Any application of storytelling in art museums would challenge the ideal of no distractions or management of the aesthetic experience, which the white cube interiors facilitate. But what experts find distracting or overly steering, may be experienced differently by novices – a user-centred design approach is necessary to develop solutions that cater to different kinds of audiences.

Some art museums have experimented with allowing visitors to contribute with their own stories inspired by objects, for others to experience. One example is 'The Art of Storytelling', a project at the Delaware Art Museum (Fisher, Twiss-Garrity, & Sastre, 2008). Such projects seem to have great educational value for those contributing with stories, but many suffer from a lack of participation amongst non-experts. In order to motivate visitors to participate, museums must show that they value alternative views (Simon, 2010), and open for stories about what the visitors themselves find relevant and familiar (Fisher et al., 2008). Participation will be a challenge for novices as long as there is a perception of a correct way to view and interpret art.

In their implementation of storytelling into the experience, art museums may choose themselves what status or weight to give the stories they tell, in how they are presented. It is important to note the museums' responsibilities when they take a role as a defining power. There should always be room to discuss the stories told, room for other interpretations, and room for visitors to add their views to the story.

Conclusion

Storytelling has the potential to enhance the on-site art museum experience, especially to offer the novice visitors the context and information they need to experience the artworks in a satisfying way. If learning about the artworks increases interest and fondness of art in general, storytelling applications may make visitors return. Stories have the power to evoke emotions, to give immersive experiences and even change visitors' values and beliefs – effects that may generate long-lasting memories that span beyond the physical visit. The article has pointed out some ways that storytelling could enhance the novice visitor experience, but in order to learn what kind of stories would make visitors return, theory has to be put into practice.

Storytelling applications where the museum constructs stories for the visitor to experience do not necessarily address visitors' social needs, which are central especially for novice visitors' experience of artworks. Perhaps engaging museum experiences should be co-designed with the visitors? Some museums are successively including visitor choices or views in their exhibitions. However, the opinion that there is a correct way to experience art is impeding co-design of museum experiences. Anyway, findings from this study suggest that it is not enough to merely invite visitors to participate, but that museums should actively contribute to cater to e.g. the novice visitor's needs. This may contribute not only to increase visitor numbers in art museums, but also to balance authority and autonomy between exhibitors and visitors.

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Making resilient research dissemination: the case of BOOST metadesign performing hybrids

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Abstract

This paper shares the process and insights from designing the dissemination of the development project BOOST metadesign. The three-year long project has developed housing proposals at the intersection of migrants, students and an ageing population, in a context of sustainability. We have been working through iterative processes of co-creation, with members from these three stakeholder groups, as well as representatives from the building sector and governance. The paper relates considerations in dissemination of the project to two principles of resilience: diversity and overlap in governance. It describes how we pursued resilience through a hybrid format of dissemination. The openness of this slideshow-performance-talkshow-exhibition-film-book has made it workable across a range of contexts and audiences. It also manifests the challenging of dominant power structures and epistemological hierarchies in design's meeting with other disciplines which the project has entailed. This has come to also include challenging the modernist legacy in design.

Author keywords

Resilience; metadesign; research dissemination; home making and housing; permaculture; co-creation, sustainability.

Introduction

This paper shares the process and insights from preparing the communication of the development project BOOST metadesign. The three-year long project has developed housing proposals at the intersection of migrants, students and an ageing population, in a context of sustainability. We have been working through iterative processes of co-creation, with members from these three stakeholder groups, as well as representatives from the building sector, local and regional governance. The work has resulted in a nuanced understanding of needs and cruxes, as well as ideas for new pathways for inhabiting and housing. This has found form through an overarching paradigm: Building and Home Making for Permaculture. (For introduction to permaculture, see e.g. Holmgren, 2000) This paradigm is exemplified through four more concrete scenarios for home making and housing: The Matching Agency, House-Human-Choreography, Trans-Port and Home Ecologics/Oikology. The scenarios provide both hands-on suggestions and perform possibilities, dreams, provocations for what it can mean, for individuals and communities, to have our homes on earth together with a multitude of species. Succinctly, our proposals take as their starting point *relationships* instead of the individual. BOOST metadesign forms part of a larger collaboration on housing, between design, business model innovation and technical prototyping, joining up several academic disciplines and research institutions. Resilience has constituted an implicit and important thread throughout this project, including the design of the dissemination of its results. This ended up a hybrid format: slideshow-performance-talk show-exhibition-film-book. Considerations of resilience have included:

- how dissemination can stay close to core values and interests even when they are in conflict with those of an audience;
- how dissemination can embrace many ways of knowing in relation to conventional knowledge hierarchies;
- how dissemination can be accessible, meaningful and agentic to diverse publics.

The paper contributes to the conference theme of resilience by relating concrete examples of how design can negotiate epistemological power structures to principles of resilience, and discussing how design for change can be resilient when facing dominant agendas and ontologies, including the growth paradigm. We hope that the paper and discussion can lend other researchers and educators in design confidence to keep opening the space of design, both pragmatically and paradigmatically. The paper specifically contributes with its focus on considerations of resilience in the design of dissemination of research.

The paper comprises a brief design research positioning, a description of considerations in the dissemination of the specific project BOOST metadesign, a discussion of how the dissemination was designed in relation to principles of resilience. Finally it offers a reflection and conclusion raising some wider points regarding dissemination of design research and working with resilience in design.

Note: The presentation of the paper will include a screening of part of the dissemination. This will also be made available online.

Design research positioning

The researchers of the project BOOST metadesign come from different design backgrounds, which means that different ontologies, epistemologies and methodologies have come into play. Most firmly, the project has grown in and with the field of metadesign, as emphasised in the title of the project. Metadesign has emerged with a need to address complex challenges where no individual or organisation alone can hold neither problems nor potential solutions. Metadesign, which therefore draws on collaborative and co-creative transdisciplinary processes, integrates questions and proposals at levels of products, systems and paradigms. It is an uncompromisingly systemic approach. In how it works synergistically informatively, transformatively and generatively, it has affinity with action research (e.g. Heron and Reason, 2001). (Giaccardi, 2005; Wood, 2007; Tham, 2014a) Architecture is an obvious entry point since the project deals with housing. The particular version that has been enacted here is one where architecture is understood as part of society building, with a bias towards shared resources. (E.g. Yaneva, 2017) Yet another important design reference point is Scandinavian participatory design (PD), which stems from an acknowledgement of the benefits of involving future users in the design process in order for those who have a stake to influence what is to come (see for example Robertson and Simonsen, 2012). In particular, the version of participatory design that has been enacted in BOOST metadesign rests on feminist technoscience (e.g. Suchman, 2007, Åsberg and Lykke, 2010, Lindström and Ståhl, 2014) which, in brief, can be described as approaches that are critical to binary divisions between nature and culture, human and technology and encourage creative means to investigate and intervene into entanglements of various actors. In addition, recent movements towards democratic (Binder et al., 2015) and caring design experiments (Lindström and Ståhl, forthcoming) are integral parts of BOOST metadesign. Finally, a key reference point has been Max Neef's framework of universal human needs. (Max Neef, 1991)

Considerations in the dissemination of project BOOST metadesign:

The project BOOST metadesign started in autumn 2016 and ends in autumn 2019. Although the efforts at dissemination became more concerted at the later stage of the project, in reality dissemination - in the sense of articulating the project to a range of stakeholders - has featured from day one. Here we therefore discuss considerations for communication during the process of the project and considerations in communicating its results.

Considerations in the communication of the project during the process:

BOOST metadesign has been a communication intensive project. It was the first time the three project members worked together, necessitating continuous articulation of frameworks of reference. The meetings of the larger project group (comprising BOOST metadesign, technical prototypes and business model innovation teams) featured different agendas with the project, disciplinary and epistemological hierarchies. Most poignantly, the group also demonstrated different expectations of what design can and should do, as well as different

paradigmatic preferences, spanning from the growth critical to growth enthusiasm. Some of the points of contention were implicit and materialised over time. Some were explicit and voiced in a particular situation. For example, once a member from the technical prototypes asked of the metadesign team, to ‘please be less wishy-washy at the next presentation’. This instance was ultimately helpful as it prompted us to make epistemological differences and understood hierarchies explicit, and to articulate how we saw our contribution to the project in more concrete terms. Over time, as the project teams got to know each other better, there was also – mostly – more respect for or at least tolerance of different positions. There were surprising affinities forming, such as the more easy comprehension between the business model team and metadesign team, than between the latter and the technical prototypes. In summary, disciplinary meetings have meant a continuous need for clarification of purpose, process, and contributions of the work in progress. Finally, the diversity of participants in the co-creation process - the target groups, older people, students, migrants, and the additional stakeholders from building sector and governance - necessitated careful and continuous communication. We needed to reach out, create trust, inspire confidence and commitment to take part in something which end-point was, too some, disturbingly open. For some participants, trusting authorities – which we as members of the university represented – did not come easy. (See also Agudelo et al., 2018). On the other hand, we were concerned about raising hopes that we might be able to affect individuals’ housing situation.



Figures 1 and 2. Co-creation workshop with a transdisciplinary group. Kalmar Castle, 16 May, 2017. Project meeting with technical prototypes team and business model innovation team. Linnaeus University, 21 May, 2018. (Courtesy of BOOST/Träcentrum, 2019)

Altogether, this has meant that we have had plenty of opportunity to rehearse both the pragmatics and paradigmatics of the project. We have tested out verbal and visual narratives, drawn figures on white boards, found examples closer to collaborators’ reference spheres. Most importantly, participants have lent us their reference points, stories, imagery and ideas. In hindsight, we can identify a certain itchiness characterising this process. We can also see that many of the cruxes that have arisen relate to the open-endedness of our field of design, and the critique of a growth paradigm. In response, we have become better at foregrounding communication with positioning metadesign as an uncompromisingly systemic approach, which does challenge conventional:

binaries, issues focus, solutions focus, and therefore by design can be experienced as unusually open. This constant rehearsal and refining of ideas with various audiences has also made us three design researchers more resilient, in the sense of being able to distil useful feedback from negative comments stemming from a different paradigm of research, being able to articulate epistemological difference when faced with epistemological hierarchies, and generally growing in confidence in terms of the appropriateness of 'staying with the trouble' of the complexity of housing needs converging with social, financial and ecological pressures, and abstaining from serving up succinct product level solutions - even when under pressure to do so.

In metadesign, we pay special attention to "languaging", a co-creative relation between articulation, conceptualisation, action and agency. (After Wood, 2005; Maturana and Varela, 1984) In this project languaging, through wording, drawing, making, enacting, cooking, has played a central role in the researchers and the participants' sense making, idea generation as well as sharing with an expanding community. The weaving together of action, reflection, articulation is intrinsic to action oriented research and co-creation. (E.g Heron and Reason, 2001) The many contact points with different audiences and groups have given us the opportunity to rehearse, try out ideas, and put ourselves in the way of "presentational knowing", the knowing that comes from articulating. (Heron and Reason, 2001) This means that communication per se has functioned as a research method. Sometimes this has been very generative and captured in notes or sketches.

Considerations in the communication of the project's results

Already from the start we knew that the generated material would be funnelled into an exhibition and a book, since this had been written into the funding application. The motivation was to reach out broadly, both to those who make decisions in their everyday mundane lives as laypersons, and those who do so professionally as part of their power positions in, for example, the housing industry, in governance, in research, as well as other epistemic and practice communities. Importantly we also wanted to give back to those who had so generously shared their time, lives and thoughts with us in the co-creation sessions. Perhaps the participants would not recognise the particularities of what they had contributed with. However, it was of significance that our interpretations and further generation of the material they had been part of making, was recognisable and in line with what had happened in the co-creation sessions. In addition, we set out to allow the new paradigm of permaculture to flourish in our dissemination, partly including the caring approach that all kinds of growing demands.

Our brief for the dissemination/exhibition and book was therefore that:

- it would be accessible, meaningful and, ideally, agentic to many different audiences;
- be possible to perform in many different spaces, indoors and outdoors, from city to countryside;

- have the possibility to be shortened and prolonged depending on the given situation.

Designing dissemination with resilience



Figures 3 and 4. In the secret house/the outhouse and swimming to the kitchen island.
Performance at Stockholm Furniture Fair, 5 February, 2019.

To arrive at a suitable dissemination format, we collaborated with a graphic designer, a curator and an exhibition designer (which meant positioning us again in languaging). We settled on a hybrid format: a slideshow-performance-talk show-exhibition-film-book. The transition from the book and exhibition to the multimedia format can be explained by a resistance of our material to stay still. It demanded movement and interaction, spontaneity, humour and risk-taking – certainly in line with the project's process. We affectionately called the dissemination hybrid our 'skvader', a Swedish fictional creature which is a hybrid of a wood-grouse and hare. We also see the hybrid format as a Cat's Cradle, or string figure in constant becoming. (See Haraway, 1994) The constant becoming between humans, architecture, housing policies, and other actors has been emphasised throughout our dissemination, partly with reference to the following quote from Donna Haraway:

"The partners do not precede the meeting; species of all kinds, living and not, are consequent on a subject- and object-shaping dance of encounters".
(Haraway 2007:4)

The form of the skvader is a set-design which doubles as a pop-up exhibition, a projected presentation with imagery, video and sound, a script performed by the three researchers, and a book prototype. The forty minutes long performance continues in a talk show with invited guests - local decision makers and local residents, followed by the opening of the exhibition to the whole audience. In spring 2019, the show tours sites where co-creation took place.

The talk show and the exhibition invite local feedback, interpretations and contributions which feed into subsequent performances and the book, launched autumn 2019. The talk show and interactive exhibition are important in:

- situating the result of the project Boost metadesign back in the contexts where co-creation took place;
- from the material prospecting concrete steps forwards according to local needs, interests and conditions.

Again, the book is designed to have agency rather than be a conventional project report. It is designed in the form of a book of Home Ecologics/Oikology, inspired by home economics. It features guidelines, discussion points, provocations, examples.

In the performance, we - the three researchers - take the role of the Matching Agency (Förmmedlingsbyrån). The Matching Agency is one of the scenarios that the project has generated, and a result of the project. The Matching Agency is a speculation of an independent organisation which matches needs with resources in a situated and fluid way. Matching can take place at the local micro level as well as macro level. Matching can take place across individuals and communities and across temporalities. In the performance, we, in the guise of matching agents, match an audience with the knowledge that we have generated in co-creation with our target groups and other key stakeholders. In this way, the skvader is a speculative enactment where we materialise a new role according to needs that arise. The matching agents bring to life the target groups - migrants, students, older population - by receiving requests from them in the form of emails. The emails are texts created from the material generated in the co-creation process. During the course of the performance, we gradually populate the set-design with fictional and factual materialisations of the narrative. We hang stories on a time line and unpack scenario drawers, revealing speculative artefacts, such as a social contract. Central to the set-design is a kitchen island. It is a devise in a story about a housing trajectory from poverty to a certain freedom and comfort, to life in an exclusive resource fiction. As we engage with futures scenarios of housing and home making, a kitchen bridge folds out to more relational, resilient – permaculture oriented – housing. The bridge is a narrative devise to support the discussion in the local setting. What might be the bridge – in terms of new artefacts, technologies, practices, regulations, infrastructures, cultures and languages to good home making within earth's limits in this particular site?

Discussion

The strangeness, imperfection and awkwardness (which we will describe) of this hybrid makes it resilient. Here we discuss how two principles of resilience (from Walker and Salt, 2006) are manifest in the skvader.

Diversity

Diversity is one of the pillars of resilience theory as it distributes risk (not putting all eggs in one basket) and ensures complementary and overlapping functions, as well as a plurality of perspectives. Diversity also has value in its own right. The skvader has followed the principle of diversity by using a range of different languages, media, messages – from the concrete to the paradigmatic, and the roles we take – as humans who dwell, women, designers researchers and matching agents. The skvader, understood as a string figure, presents shifting narratives at different occasions. It becomes with the local context, residents and decision makers. It also moves with our growing understandings during the tour.



Figures 5, 6, 7. Diversity of explorations. Enactment. Cooking. BOOST Symposium, Linnaeus University, 15 December, 2017. Spatial mapping. Småland Food Lab event, Linnaeus University, 6 September, 2018.

Although diversity is a celebrated quality, for example in the Western academic institution and in Western mainstream politics, it also (as political developments in many European countries only show too well) causes tensions. The practical manifestation of diversity, as exemplified by the skvader, presents a break with modernist design ideas of unified message and form, finished objects, solutions, perfection, clarity of authorship. The modernist project is in turn entangled with the growth paradigm, a Western hegemony, patriarchy. In hindsight, we see the discomfort at the open-endedness of our project in our collaborators as very much originating in the opening up of categories. We have experienced versions of this discomfort ourselves, such as when we found it difficult to leave the familiarity of modernist icons in terms of, for example, the look of workwear and coherent typography. During the process, our awareness has grown in terms of

the omnipresence of implicit design rules – such as unified message and language of form - which perpetuate even radical projects' entanglement in paradigms they seek to challenge.

The range of roles we present in the skvader contributes to diversity and also awkwardness. An example is a passage where we switch from matching agents to lay people with the cue "I need a wee, I do too, me too". We step behind the green screen entering the Secret House, in Swedish Hemlighuset – Outhouse. Here we can discuss the lack of references to body fluids and intimacy in the material, as well as the project's short comings in honouring, for example diversity, as well as the shame of a housing system that thrives on investments at the same time as homelessness is on the increase. It was important for us to present this diversity of roles, to make ourselves vulnerable in this way. To us it is consonant with feminist ways of knowing, and it contributes to making the skvader porous. By porous, we mean offering many doors to engagement (Tham, 2008) and the space for different publics to complete the, by design, unfinished product we offer. In the project, we refer to this agentic openness as 'Trans-Port'. Trans-Port is a scenario that discusses needs, dreams, proposals for accessibility and voluntary withdrawal. Yet, the most significant dimension of transportation is to us the doors to learning, transgression entailed, hence the hyphen.

Overlap in governance

Economic Nobel laureate Ostrom has described how less authoritative systems can demonstrate a greater flexibility in responses. (Ostrom, 1999) A benefit of a decentralized governance is that it can be more resilient in the face of sudden changes in conditions, but it can also be perceived as messy. (Pisano, 2012; Tham, 2014a) The resilience theme of overlap in governance is played out in our strategies to challenge dominant power relations. Power relations has featured a strong theme from writing the funding application to planning and conducting the dissemination of the project BOOST metadesign. For example, we regard the identification of target groups – older people, migrants and students – as problematic; it homogenises heterogenous groups that are artificial constructs, in reality comprising many overlaps as well and diversity within each 'group'. (Ståhl et al., 2017) Through the process, we have therefore positioned the citizen participants as guides towards new housing possibilities and paradigms rather than receivers of solutions. By concertedly valuing decision making in a range of sites, the domestic, the formal political, industry, academia; we have further tried to disturb dominant power structures. The loosening up of our roles, as evidenced in the performance, is a way to decentralise our power privilege in a conventional knowledge hierarchy. Again, this way of presenting ourselves as fallible, human, women, and incomplete – i.e. in need of contributions, is in conflict with a dominant design narrative of the guru. Power relations has presented awkwardness also in the internal process, as described before, in the meeting with the other project teams, but also in the relations between the three researchers, as we have intermittently adhered to formal structures, for example a project leader, academic rank, and sought to ignore or treat them lightly. We have also experienced a sense of

powerlessness in the face of dominant housing strategies, but also felt empowered in the response from participants valuing the, at least temporary, voice the project has made space for. We have sought to shift power, for example at a housing gala where we asked workshop participants to consider what they personally would be able to forego in order to address power and resource imbalances in the housing system.

Conclusion

This paper has described and reflected on the dissemination of the co-creative project BOOST metadesign which has developed proposals for housing at the intersection of migrants, students and an ageing population, in the context of sustainability. The paper has related the hybrid dissemination format that we have developed to two principles of resilience: diversity and overlap in governance. We argue that while we perceive the hybrid dissemination to, in the specific context, perform resilience, this simultaneously challenges dominant pillars of design. While the project has from the start challenged the dominant system and paradigm of housing development and therefore staged conflicts and negotiations with other perspectives and other disciplines, during the project's course, the tension with our own design heritage has also become explicit.

It has been a privilege to work in co-creation sessions and in other ways with the various stakeholders that have contributed to and troubled this work on housing and housing development. On the one hand, resilience and permaculture thinking have been integral to this process, informing, for example, methodological choices implicitly and explicitly. On the other hand, they have emerged as overarching frameworks that have been articulated in various ways, for example through four concrete scenarios, and therefore become headlines in the dissemination of the project's results. This reflects our growing boldness in challenging dominant paradigms in the housing sector.

The ways in which we have been disseminating our research since the start of the process, including co-creation sessions and the communication of project results, have all been an entangled part of our design approach. We write this since, for example, the enactments of scenarios such as the Matching Agency should not be confused with other forms of creative expressions, such as theatre. Instead, they constitute an extension of design. Although we do not want to claim or name a new design field, we notice that there is an emergent line of design (research) projects that work with performances of various kinds. Moving forward, we suggest that performative design, building on design scenarios, enacted by the researchers themselves merit more exploration.

As researchers based in the academic system, we are expected to publish through recognised academic channels. Currently, the dissemination format that we have experimented with is not rewarded within the conventional system. We would like to raise the discussion of how design for resilience, which may in its pursuits to be agentic take alternative pathways of dissemination, can be recognised in academia. Moreover, we would like to discuss to what extent academia, entangled in the modernist project, growth logic, competition, is

equipped for complex global challenges which require resilience thinking. (See also Tham, 2014b)

Finally, we would like to continue a discussion on what resilience profoundly means for design ontologies, epistemologies and methodologies. To us, the skvader is one answer to a need for resilience research dissemination. It might come across as not strong enough since there is not one key message, a unity of form and language, a finished project, and because authorship is distributed. Yet, due to its unfinished quality and variability, it has many openings for participation and contribution. We hope to inspire confidence to open up design throughout the design and research process, and dialogue on how such openings can be manifest in design education and at design conferences.

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Intersections/Interactions: Artists + Designers Visualize Environmental Science

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Abstract

In this paper we outline practices, cases studies and insights from a spring 2018 Interactive Data Visualization studio course at ArtCenter College of Design in Pasadena, California, U.S.A. We partnered with the Woods Hole Oceanographic Institute, affiliated with the Massachusetts Institute of Technology (MIT), to explore how interaction design could improve Oceanographers' work both on and off land and impact their science, both theoretical and practical. The project won a grant from the National Academies Keck Futures Initiative (NAKFI) to bring together scientists and designers to tackle an increasingly difficult challenge: to see, extract and communicate insights from complex data in narrative, scientific and educational contexts, while maintaining the integrity of the original data.

We also hope to convey new teaching models and frameworks for complex partnerships within an institution and between partnering schools and universities. These create a richer student experience, develop faculty teaching skills, fulfill partner needs and garner opportunities for funding. In this example, we applied Interactive Data Visualization and Human Centered Design (HCD) to a scientific problem but find that the methodology as it unfolds in the speculative syllabus of the lab is equally applicable to other types of collaborations and experimentation.

Expanding human centered design practices to support scientific methodologies and non-designer practitioners in multiple locations in a 14-week syllabus, undergraduate students created solutions that ranged from software User Interfaces (UIs) to Augmented Reality for collaboration, Immersive Exhibits and physical 3D printed teaching tools. The syllabus leveraged faculty experience in directing the joint Caltech/ JPL/ ArtCenter Interactive Data Visualization program and resulted in student internships, an ongoing Augmented Reality in HoloLens development and publication in peer reviewed literature.

We believe that new techniques for designing syllabus, engaging students, working with subject matter experts have resulted in unique student outcomes and professional pathways. Project outcomes have ranged from physical computing, immersive environments, performances and software but more importantly students have learned how to navigate and research the nuanced, specific world of science practice to develop unique insights. These qualitative insights then drive strategic prototyping and participatory design with partners—a now standard Human-Centered Design (HCD) methodology. However, taken

in conjunction with the scientific partnership, emerging discipline of interactive data visualization and new canvases, the student outcomes and faculty pedagogy reveal a number of best practices, approaches and methods that we hope would benefit the larger art and design educational community.

Author keywords

Interaction; data visualization; interdisciplinary; environmental; teaching; social innovation; partnerships

Introduction

With a grant from the National Academies Keck Futures Initiative (NAKFI), an interdisciplinary team of Dr. Larry Pratt of Woods Hole Oceanography Institute/MIT, Maggie Hendrie, Chair of ArtCenter College of Design's Interaction Design Department, Santiago Lombayada, Interaction Design faculty at ArtCenter and a Research Scientist and Lecturer at CalTech, and Jennifer May, Director of Designmatters, ArtCenter's social innovation program, came together to facilitate a 2-term series of projects with undergraduate students. Working with complex scientific data and employing human-centered design methodology and design-thinking along with current technological methods, students developed innovative interactive concepts that would assist oceanographers to gain new factual insights as well as communicate the science to a broader, non-scientific audience.

Designing the program: taming complexity

Prior to working with students in the classroom, Hendrie, Lombayada and May addressed how best to:

1. Articulate the value of interaction design and social innovation to non-traditional partners.
2. Navigate the complex constellation of partners and funding.
3. Understand expectations from scientists, students, funders and faculty.
4. Balance experimentation + predictability through a unique studio pedagogy which outlined the method, without prescribing the outcome
5. Keep subject matter from becoming the sole outcome.

Designmatters has long experience in designing cross functional, multi-institutional programs with grant funding. Designmatters is structured across three purposes (Figure 1). The program acts 1) as an educational magnet for curricular content and research opportunities in the emergent field of design for social innovation, 2) to provide incubation support for student-driven projects towards implementation, and 3) as a center for collaboration with cross-sector organizations, many of which do not traditionally partner with art and design educational programs.



1. An **educational magnet** that provides content-based challenges and opportunities for **transdisciplinary research** in design for social innovation
2. An **incubator** that supplies students with the know-how and resources needed to implement their ideas or launch their own **social enterprises**
3. A center for **collaboration** with innovative organizations and networks that are committed to **design for social innovation**

Figure . Designmatters program model

In order to partner with nontraditional organizations and conceive of projects that deliver educational rigor to the students as well as new insights or outcomes for the partner, Designmatters must articulate the value of design and specific design practices to partners who may be unfamiliar with the depth and complexities of these practices. The program accomplishes this by sharing its long history of past projects through case studies and publications, and by creating opportunities for partners and funders to interact with students and faculty before embarking on a larger project that requires funding and resources. Prior to this project, Designmatters arranged for a small group of students to attend the 2016 NAKFI Conference: Discovering the Deep Blue Sea to act as visualizers, helping scientists and researchers realize their speculative concepts in real time. The scientists were intrigued by the design students' ability to quickly translate scientific research and abstract concepts, which can be difficult to articulate even for experts, into clear and dynamic visuals. Four scientists from research organizations reached out to Designmatters to pursue concepts for educational projects and partnerships, including Dr. Larry Pratt of the Woods Hole Oceanographic Institute/MIT.

The challenge posed by Dr. Pratt was for the students to simply create new static visualizations of Woods Hole's data on ocean eddies; by explaining the pedagogical model of Designmatters (Figure 2) and the capabilities of interaction design as related to data visualization, Dr. Pratt was persuaded to broaden the ambition of the project to include the development of tools to generate new data insights and engage multiple audiences with the data. ArtCenter faculty and Designmatters staff generated a project brief with Dr. Pratt that served multiple purposes: 1) as the basis for a NAKFI grant proposal to obtain funding for the project 2) to clarify the goals and outcomes of the studio so the expectations of all stakeholders, including partners, funders, faculty and students were clearly defined. Designmatters Director May acted as liaison between all key stakeholders throughout the project to ensure the project brief was fulfilled for all.

1. Co-creation and participatory research methods



2. Transdisciplinary and team-based collaboration



3. Integration of the College's liberal arts curriculum



Figure 2. Designmatters pedagogical model

Hendrie and Lombeyada worked within the framework of the Designmatters pedagogical model and project brief to generate the syllabus of the course. There were multiple, interconnected learning outcomes for the students including the intersection of Interaction Design Methodology with Data Visualization, layered with understanding ocean eddies, how to work with scientists (framed as both subject matter experts and potential end-users), and developing collaborative skills through teamwork. Overlaying all of the outcomes was the overall purpose of the project in the context of social innovation: making science accessible to multiple audiences and enabling scientists to better understand our world and climate (Figure 3). One of the challenges of the syllabus and course was ensuring that the understanding of the complexities of ocean eddies and specific data sets was not the primary outcome for the students, and that the students understood how to utilize subject matter experts to gain insights without becoming experts themselves.

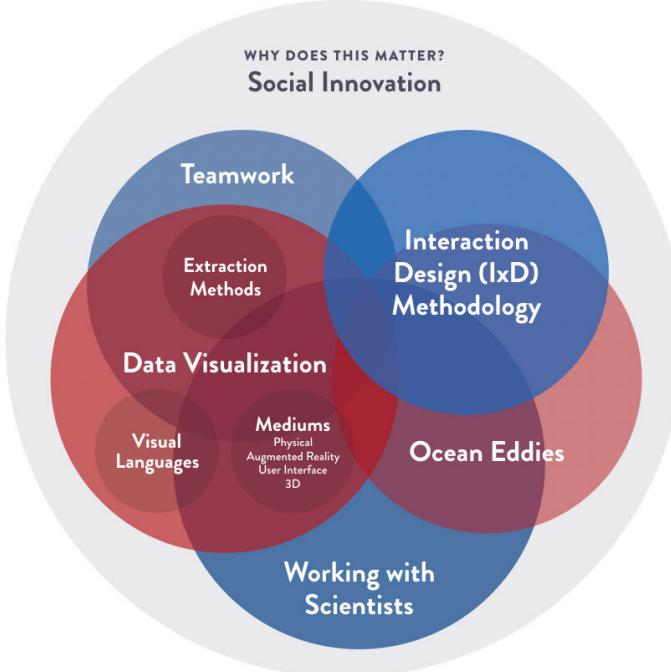


Figure 3. Studio learning outcomes

Students were introduced to key concepts in data visualization and information design in materials from Manuel Lima (2011) and approaches to understanding underlying data science concepts (Tamara Munzner 2014). Leveraging existing skills from interaction design foundational classes, contextual inquiry and structured sessions exposed students to marine science through the scientists' day-to-day practice. Given the complex set of new skills, subjects and partners it was important to synthesize material, prioritize activities and relate each step to the actual project and overarching purpose of the class (Figure 3). Project-centered learning is a well-documented approach to design-teaching (Roessingh, Hetty; Chambers, Wendy, (2011), but students were clearly motivated not only by the *project* but by the *purpose* of the social innovation lens. They were inspired and encouraged by the opportunity to demonstrate design's potential contribution to climate science.

Understanding the Science

Dr. Larry Pratt from Woods Hole Oceanographic Institute joined Art Center faculty Maggie Hendrie and Santiago Lombeyada to challenge students to develop interactive data visualization opportunities about flow patterns of underwater movement caused by ocean eddies. These eddies fill the ocean and are vital to the ocean's health and its role in the Earth's climate. In addition to

major current systems such as the Gulf Stream, the ocean contains complex swirling motions that range in diameter from hundreds of kilometers down to five kilometers or less. These features are known as ocean eddies and are evident in satellite images of the sea surface. Some of the more prominent eddies, such as Gulf Stream rings, extend down as far as 1000 meters below the sea surface and create complex, three-dimensional circulation patterns that are felt throughout the mesopelagic zone.

Ocean eddies also transport properties (nutrients, oxygen, biological populations, heat, momentum, etc.) from one location to another, both vertically and horizontally. Nutrients brought to the surface stimulate biological productivity, including the growth of phytoplankton, which in turn produces about half of the oxygen that living creatures need to breathe. Eddies are essential to life on Earth – yet their evolving, 3D nature makes them extremely difficult to view and understand.

Advanced methods for data visualization help oceanographers study these complex objects and the currents that they induce. As water circulates around an eddy in a spiral manner, many water parcels form complex surfaces, often twisted and folded in unrecognizable ways. These twisted and folded surfaces are objects that oceanographers would like to better visualize and understand. Ocean eddies have the potential to help scientists learn how important properties such as oxygen and nutrients are distributed.

These surfaces could also provide a template to better understand ocean circulation. Such a template will be inherently multifaceted with many interleaved surfaces and surface-free zones of chaotic mixing. Current relevant data can conceivably create such a template with appropriate design skills.

With new technologies evolving at a rapid pace, scientists have been generating model data on mesopelagic eddies, knowing that data visualization will provide the interactive and dynamic display needed to better understand this extremely essential ocean phenomena. Building on their work in other Data Visualization programs, faculty developed lectures, hands-on activities, in-class assignments, homework and prototyping. Students were presented with the challenge: understand, extract and communicate insights from the current eddy data into narrative, scientific and educational contexts, all while maintaining the integrity of the original data.

Students examined how data is ingested; that is, how data is sensed, sourced, acquired and manipulated into data sets. They surveyed and assessed the intuitive nature of presentations and analyzed best practices for effective interpretations that could include the latest methods from computing, user-centered design, interactive design and 3D graphics and printing (Colin Ware 2013). Additionally, students evaluated data through an artistic lens, discovering how to effectively transform the veracity of the data into graphically effective designs and interpretations that would resonate emotionally with both a scientific community and public audiences.

Engaging Working Scientists

To better grasp the distinction between “ground Truth” data i.e. data that is empirically observed and conceptual data models, the team made a field trip to the Scripps Center for Oceanography’s Research Vessel the Sally Ride in San Diego Harbor, led by Professor Matthew Alford of the Marine Physical Laboratory. Students interviewed scientists and observed their contexts of work. Faculty led students through the Discovery process and structured participatory design research methods to facilitate student-expert sessions. Overall, students were challenged to design interactive and dynamic displays of complex information that would provide “insights into the invisible,” which is at the heart of effective data visualization.

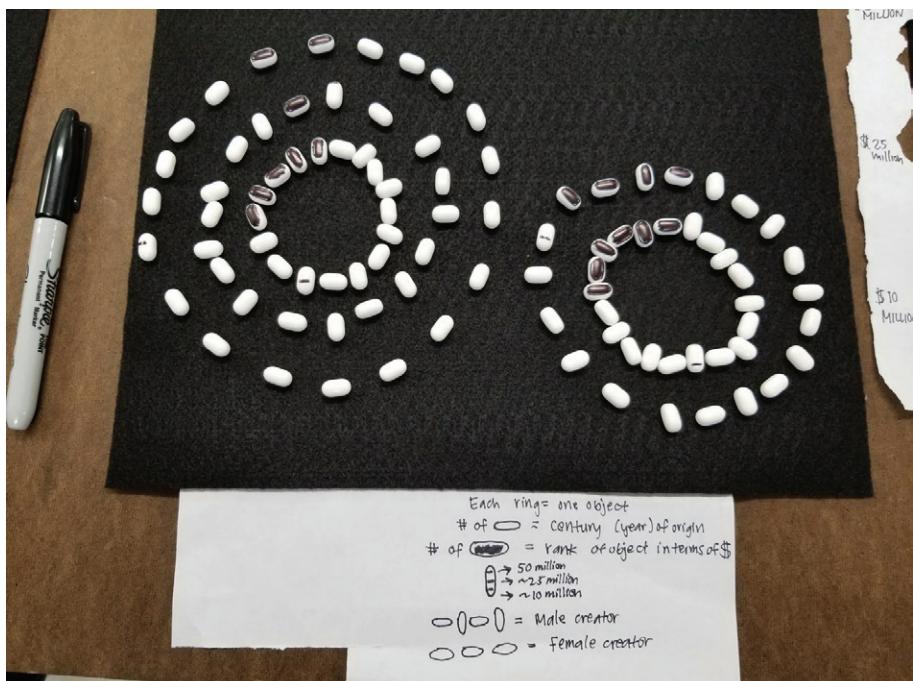


Figure 4. TicTac analogue exercise- understanding how data channels are encoded in visual design

Students analyzed how data has been traditionally represented through charts, graphs and design elements. They examined the thinking behind abstract data (which can include numerical sequencing) as well as 2D and 3D data (which can involve geometric shapes). Current models and hands-on assignments enabled the students to comprehend how a specifically detailed presentational visualization helps viewers understand, compare and make informed inferences from the data (Figures 4, 5).

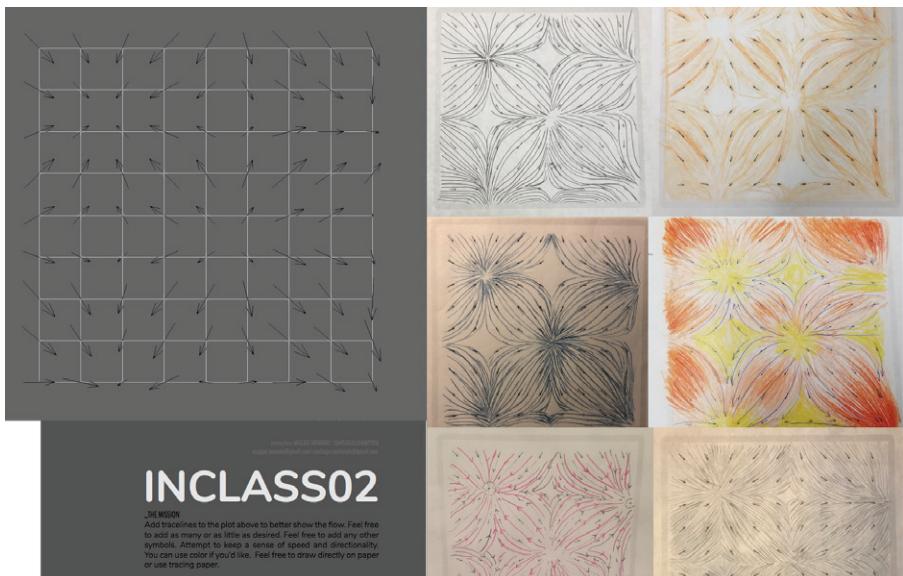


Figure 5. Flow exercise- generating multiple approaches to demonstrating flow, velocity and direction

Students were exposed to informational layout of data (e.g. charts and graphs), paying attention to the correlation of the scale and size. They observed how data points can reveal specific data attributes depending on their position, orientation, shapes, color and texture as well as describing motion by vibration or deformation. They studied how to sort and format for the most effective ways to show trends, information and compilations in order to present a clear understandable snapshot of scientific findings. Students also learned that humans process visual information more effectively and, often, more emotionally than text. (Colin Ware, 2013). Human brains are wired to make connections when introduced with a series of facts and information; this subconscious understanding is manifested in the layout of a smart phone scroll, the design of a billboard or how a newspaper is formatted.

Data visualization is often used for a purpose: to present a question and/or to prove a point. Insights used in a visual format must be well-constructed for meaning; students learned to avoid “chart junk” (Tufte, 1983, 2001) which are items that either don’t support the data or that are confusing/misleading. Students were encouraged to sketch out ideas on paper before using a computer to better understand the creative process. They also examined the different platforms and canvases to communicate data with varying degrees of interaction, multiple audiences and interactive techniques, including data journalism/advocacy and emerging technologies ART (Augmented Reality above the Tabletop) and CAR (Computer-Assisted Reporting).

Faculty curated an online board where students posted weekly examples of both effective and confusing visualizations along with homework, in-class assignments, research items and project iterations. Concurrently, students were introduced to the physics of ocean circulation; videos from space and NASA

animation depicting eddies in motion provided a 2D experience. Students learned the various representative visualizations that describe the flow and movement of water; they analyzed the components of the vorticity of a curl along with other physical fluid concepts, especially noting how data can be presented as moving and directional.

Students examined how scientists visually label information about fluid movements via critical points when flows interact and/or intersect with one another, learning how these critical points are represented in 2D and 3D (Figure 6). Lectures, in-class exercises and assignments reflected students' grasp of the material and the scientific principles. Faculty encouraged the students to question their choices, always circling back to basic foundational questions: "Are the details necessary?" "What is working?" "What needs help?"



Figure 6. Quick sketching with scientists

Class assignments included crafting/sculpting a 3D visual representation of a fluid flow, designing quick sketches and conceptual poster-sized images, data mapping for a specific story/takeaway, and more. Student work was evaluated and critiqued based on:

1. Traceability to core visualization principles and real data
2. Clarity of presentation
3. User experience story for each user type
4. Effective prototyping, i.e. employing the appropriate level of fidelity, toolset and functionality for the hypothesis or idea being tested.
5. Integration of insights from users and experts
6. Pathway towards a unique scientific insight

Working in Teams

Prior to the mid-term, faculty split students into four groups, who each created 15 idea sketches that would become the first steps toward their final projects. Through this generative ideation phase, students considered exploration of the actual scientific data or a more personal understanding of the chaotic nature of eddies. As a team and through studio critique, they honed these initial thoughts down to three creative concepts which they presented at the mid-term. Ideation needed to showcase specific facts and truths, representing them with clear intention and gauging their impact on intended user types. One direction needed to focus on an analytical tool while another was to be more data-empathetic.

In addition to feedback from Hendrie and Lombeyada, student teams met with Dr. Pratt to discuss initial thoughts and concepts; he advised each team on how to possibly refine or redirect their concepts using the scientific data collection and to consider the end user's point of view.

At mid-term presentations, student teams introduced three rough concepts on multiple platforms. Guests from other ArtCenter departments and CalTech provided feedback to help direct teams on which concept to focus their attention and efforts for their final project. Teams then worked to refine their projects by creating personas and "A Day in the Life" scenarios which helped direct their design thinking and ideation with the end user in mind. They created prototypes, often multiple iterations, and field tested their ideas as they reshaped their concepts. Students often examined existing tools currently used by researchers (SPIN Lab, MATLAB, ParaView, etc.), comparing the technology to their project goals as well as to "use cases". Use cases outlined the key goals, steps and specific actions the scientists would take as they engaged with the digital system.

All through the prototyping phase, student teams realized that staying true to the integrity of the data should be the through line in all their conceptual ideas coupled with keeping the needs of their intended users as a guiding principle.

Four Project Outcomes

PARCEL by Students Akshay Agrawal, Michelle Kim and Pooja Nair

A software tool, Parcel provides oceanographers with a more detailed understanding of data generated in eddy simulations by allowing the user to select, explore and analyze the complex phenomena in numerous ways through 3D screen visualizations (Figure 7).

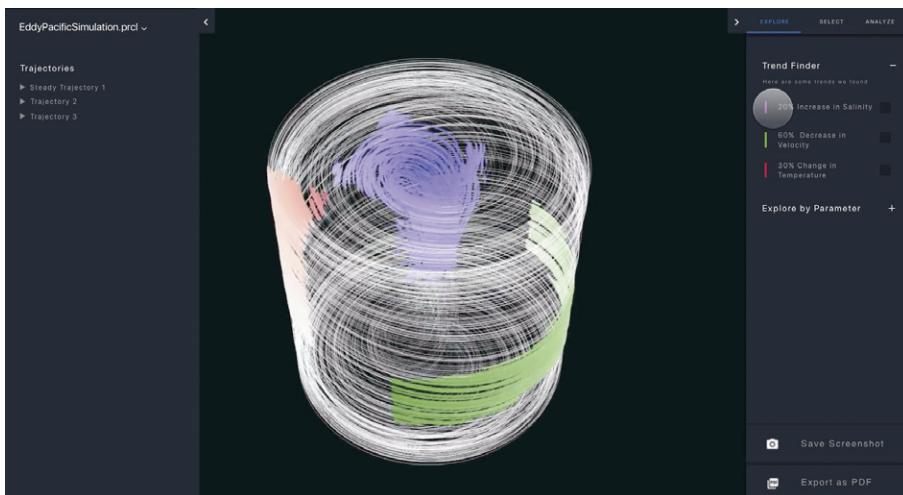


Figure 7. Parcels Team; User Interface of scientist toolset visualizing properties for temperature, salinity, density, pressure and velocity

Using a prototype created from data algorithms, researchers can select individual and/or bundled eddy trajectories and, using a series of predetermined constraints, can highlight movements, filter the focus and discover eddy behavioral trends. Researchers can separate out eddy properties for temperature, salinity, density, pressure and velocity, which can provide a more in-depth understanding of the eddy mechanics and physics at work.

Additionally, researchers can easily share their explorations with peers. The software has a clean, simple-to-understand design and is flexible to be modified for other scientific fields of research.

EAV (EDDY AUGMENTED VISUALIZATION)

by Students Christin Carolina, Jie Gu, and Gabriela Sudirja

This scientific discovery tool puts eddy data in Augmented Visualization (AV) software to provide an interactive, non-intrusive experience of eddies that is more realistic than traditional 2D presentations and can assist researchers in discovering new insights. The system can be implemented in a researcher's office or laboratory and could be used at sea.



Figure 8. When researchers put on the AR glasses, they can visualize the eddy from different viewpoints and filter out specific factors. Using large gestures (grab, swipe, pinch, rotate, etc.), they can separate layers, zoom and track, push away and push to save the results

Using a logbook and AR projection in tandem, researchers can understand a specific eddy through its external and internal factors such as relative position, size and spatial relationships as well as the time and location originally observed. Since vision of the laboratory surroundings are not impeded by the glasses (as would be the case for VR) they researcher has access to all his or her laboratory equipment. Finally, researchers can annotate and share their findings with colleagues (Figure 8).

3DDY by Students Jing Qiao and Wenyuan Xu





Figure 9. Students created multiple iterations of 3D prototypes. Early versions mapped actual data to physical properties in this teaching tools so that educators and students could deconstruct the model and “see” specific eddy behaviors.

Beginner oceanographic students can learn about the physical properties of eddies through a lab learning process that employs 3D acrylic models which can be separated by layers and analyzed in-depth. Inspired by Russian nesting dolls, kaleidoscopes, and science display drawers, this educational tool presents colorful slices of eddies in layers which can help students visualize eddies in a more realistic context from inside and outside (Figure 9). In a learning lab setting, students can remove vertical and horizontal slices and place them on an accompanying interactive table to match what activity is happening at that specific layer (velocity, salinity, etc.). The transparent slides also give the viewer a 3D picture of eddy properties without removing slides (Figure 10).

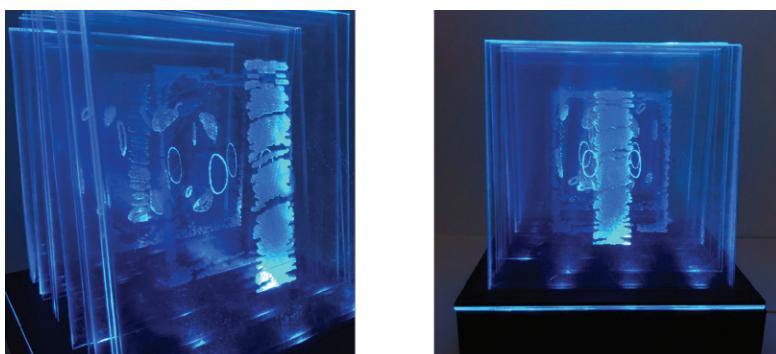


Figure 10. The acrylic 3D models can also be created with engraved slices and lit to further add detail to the complex structure of an eddy.

FLOW by Students Joyce Chiu, Sam Giambalvo and Christine Ye

Students and the general public can learn about the internal structure of ocean eddies through play at an interactive installation that employs a Kinect to capture body movement and multiple projectors that simulate how eddies move and interact. When participants enter the creation zone, a sensor is activated. By spinning and raising their arms, participants will “create” a swirling vortex eddy which will be displayed on a nearby wall. Varying the height of the extended arms, participants will see different internal images of an eddy. Coloration reveals how the eddy’s temperature depends on its depth.

Possible eddy visualization display prototypes include an abstracted version (simplified animation), low-fidelity (incorporating body movement and light), and high fidelity (precise scientific models with overlayed parcel).

Second Term Directed Study by Students Pooja Nair and Netra Ravishankar (CalTech)

Based on the outcomes of the studio class, a small team of 2 students from ArtCenter and CalTech, led by Santiago Lombeyada, developed an application in Augmented Reality (Hololens) (Figure 11). Professor Andy Thompson of CalTech shared his data and participated in design sessions. This technology proof of concept demonstrated that the models, design and toolset were transferrable to new data sets and marine research projects. Specifically, it supported common needs of oceanographers to; cross-reference, extrapolate and compare data in a visual environment. Furthermore, this collaboration resulted in a design student internship in a data viz program and human interaction lab at NASA’s Jet Propulsion Laboratory, demonstrating both the transferability of creative skills and the emerging professional pathways available to students in the data design field.

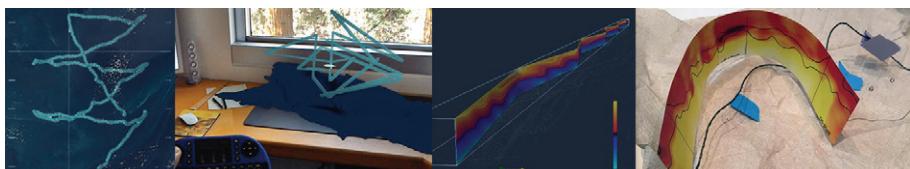


Figure 11. ARVO augmented reality views

Conclusion

Whilst we hope other designers, institutions and scientists can benefit from our framework and case studies, the authors are aware of potential limitations in the projects cited. I.e. we did not work with dynamic data-sets (those that change in real-time) or build final software for general distribution, and we focused on marine-science. The authors are also aware of the ongoing need for

dialogue with science partners about design's scope and capabilities. For example, future projects should emphasize, at the outset, the mission of HCD to innovate and solve real-world problems as opposed to a purely illustrative, decorative or aesthetic practice.

The broad range of design solutions and iterative design process gave a wide but necessarily high-level set of prototypes. Future projects, or those that pilot other new methodologies, may be more effective with narrower use cases or pre-defined technology platforms. For example, targeting screen, spatial or AR/VR prototypes only, rather than all of them in parallel. Lastly, if time had been available, the project could have further leveraged the sources used in the Contextual Inquiry phase for extended critiques and user testing. Their multiple points of view might have allowed the students to more effectively synthesize and prioritize their insights and concepts.

However, we would hope that others leverage our experience, especially techniques for working with scientists, grappling with the profound need for accuracy in the data life cycle – from acquisition to communication - and in the opportunity to design new expressive, exploratory and communicative environments for data. Our initial hypothesis, that skill building, data literacy and subject matter research could happen in parallel, was borne out by the student projects. Furthermore, a key criteria for scientific relevancy- that the integrity of the data be maintained in the final treatments- was also met. This meant that the data could be traced to its origins, was accurate, and visually encoded in ways that align with scientific specificity e.g. the visual attributes (e.g., color, size) of graphical marks (e.g., bars, lines), labels and interactions communicate the clarity of the science, avoiding what Tufte calls the "lie factor". Driven by the rapid increase in volume and complexity of scientific, commercial and behavioral data, practicing designers and design students are required to develop these new research, communication, and creative practices.

Our goal was to transform how scientists view design- from a simply an aesthetic treatment to a vital part of their scientific toolset. The project funder, NAKFI, reported "These projects highlight how art-science collaborations can engage the public and other scientists and encourage discourse in important issues. They also represent concrete projects that have transcended the national conferences and led to not only scientific impact but also educational, cultural, and social influence...highlights how inclusive conversations, pluralism of perspectives, and experiences that eliminate systemic barriers to interdisciplinary collaboration can lead to innovative solutions."

Acknowledgments

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Professional Papers

Placed: Historical Networking Digital Platform to Collectively Archive Our History with Augmented Reality (AR)

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Abstract

The project, called *Placed*, is an interdisciplinary project in between design, digital storytelling, anthropology, sociology and history. *Placed* is an interactive historical networking platform that empowers communities by giving people the tools to record and celebrate their past. *Placed* creates a digitally augmented layer over the physical geography of each city in which it operates and provides a timeline that allows people to view many different historical stories for any location. *Placed* empowers people, especially underrepresented communities by giving them a voice and a richer understanding of the contributions they make to their community. *Placed* is a fun and engaging way to help us preserve the past—*all* our pasts—through digital storytelling to remind communities about the cultural and personal heritage of our shared spaces and places. *Placed* also provides invaluable information to both governmental and non-governmental agencies. Collecting these many perspectives and histories allows community planners to make more sensitive and conscientious judgments about future development and anticipate issues and problems before they arise.

Author keywords

Interaction, Digital, Storytelling; Community Stories, History; Augmented Reality (AR), Participatory

Introduction

Official histories often focus on large locations: monuments, battlefields, government buildings and the homes of the rich and powerful. Unfortunately, our own unique and authentic histories are often lost, submerged under the weight of the authorized versions, the official tales. We believe that it is vitally important to put 'place' back into 'space' to make visible things that have been hidden, lost, changed or forgotten. Rather than having an organization or institution dictate what is historically relevant, this platform allows users to create their own archives.

Doreen Massey explains that how people identify with places is connected to the histories that people tell about them, how these stories are told and which history becomes dominant. [1] *Placed* asks historians not to act as curators of information, but rather gives individuals and imagined communities the agency to make their own needs felt. These stories will help historians, urban planners and policymakers to more holistically understand communities from the ground-up. *Placed* is, at its core, a data collection device. It provides data about the physical environment, particularly as seen from the perspective of underrepresented people, which cities can even use to inform their planning decisions. This pilot project focuses on the City of San Marcos, Texas, United States, and the project has a potential for scalability for any city, town, or geographic area.

Background

In essence, *Placed* eliminates the monopoly on history held by those who have the most wealth and power in society and instead gives a voice to the marginalized and forgotten members of communities who have their own stories to tell and share. Clark argued that in order to change the condition of the underrepresented residents, the power dynamics need to be changed between the underrepresented residents and the majority society outside of the confines of its "invisible wall." [2] *Placed* has reached out to underrepresented communities, such as the Calaboose African American community, Centro Cultural Hispano de San Marcos, and The Indigenous Culture Institute to hold focus group sessions to create an opportunity for the community members to gather and share their lived stories. By being able to share our own stories, formerly disenfranchised citizens will be empowered and feel a stronger sense of connection with their communities that can lead

to exponential benefits for both the individual and the community as a whole. Nicholas Carr said what gives real memory its richness and its character, not to mention its mystery and fragility, is its contingency. It exists in time, changing as the body changes. Indeed, the very act of recalling a memory appears to restart the entire process of consolidation, including the generation of proteins to form new synaptic terminals. Once we bring an explicit long-term memory back into working memory, it becomes short-term memory again. When we reconsolidate it, it gains a new set of connections; a new context. [3] Placed not only provides a digital platform for the voiceless, but also provides valuable information to both governmental and non-governmental agencies that seek to help their communities.

There are few existing projects that incorporate history, interactive maps and stories. [Historypin](#) and [Pluggy](#) are great examples that integrate a digital map with history on a digital platform. Both projects have a similar vision as *Placed* in regard to people sharing and preserving local history. Furthermore, like *Placed*, the projects consist of a shared archive and a collaborative approach to engagement to communities and schools to engage local residents in the project. The biggest difference between the two existing platforms with *Placed* would be that *Placed* features a user-friendly mobile application that will incorporate Augmented Reality (AR) with geolocation to create a digitally augmented layer over the physical geography. That will allow the users to view old photos of the same locations from where they are.

***Placed* Project Methodology**

The development of *Placed* takes a user-centered design approach with several user evaluations in the field. Prototypes of *Placed* will be evaluated through custom usability tests and expert reviews to evaluate its main functionalities. In order to achieve the goal of the project, we follow four processes **1) User-Research, 2) Prototype various design solutions, 3) User-Testing with small group, and 4) User-Testing with Large group and implementation.**

Process: User-Research

The humanity scholars hold a series of presentations on how community, society and history are understood by sociologists, historians and anthropologists. Also, the leaders from community organization have direct presentations to share their concerns about archiving their history and what they would like in this kind of project. Tuan examines how places acquire their meanings and images for people through the quality and intensity of interactions and experiences [4]. Through the User-Research process, we conduct a series of interviews with the community members to share their lived stories to understand user behaviors, needs, and intentions using

different observation and feedback. The User-research process is conducted before the first sketch is drawn and integrated throughout the concept, iterative design and launch phases of the project.

Process: Prototype various design solutions

MiHyun Kim, Assistant Professor of Communication Design at Texas State University hosts *Design Sprint*** [5]. *Design Sprint* functions to clearly define the vision for the project. It also allows us to test our assumptions, decide on a product roadmap and encourage user-centered thinking that guides our design document. We examine multiple potential design solutions to apply the methodology to inject speed and innovation into the project development process.

***Design Sprint was created by the Google design team. It is a group creative brainstorming process that has a five-phase framework that helps answer critical project questions through design, rapid prototyping and user testing with potential users. The process helps spark innovation, encourage user-centered thinking and align a team under a shared vision.*

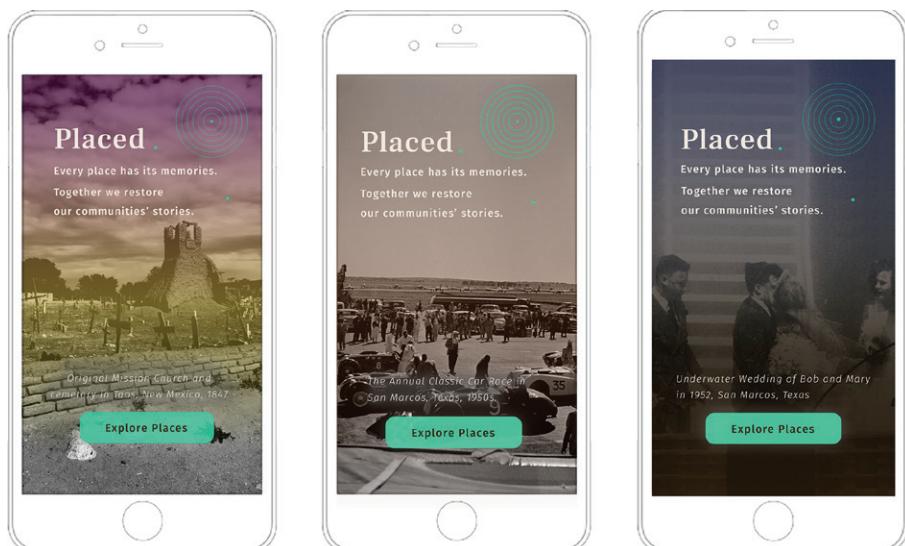


Figure 1. Digital Mobile Application Design prototypes for *Placed: A Digital Platform* that collectively archives our history with Augmented Reality (AR). The prototypes display several loading screens that change every time the app is open. The photographs on the screen are contributed by different users.

Image Credit: Texas State University, Albert B. Alkek Library, Library Archives

Process: User-Testing with Small Group

The digital team creates multiple digital prototypes from 3-2. *Process: Prototype Various Design Solutions through Design Sprint.* We discover what user flows make the most sense for user-centered design and how UI (User-Interface) and UX (User-Experience) should be designed to engage the users effectively. The discussion helps narrow our several ideas down to the best prototype and helps us discover how to move beyond the traditional web presentation and mobile application design by developing a new model for digital engagement with maps and AR technology.

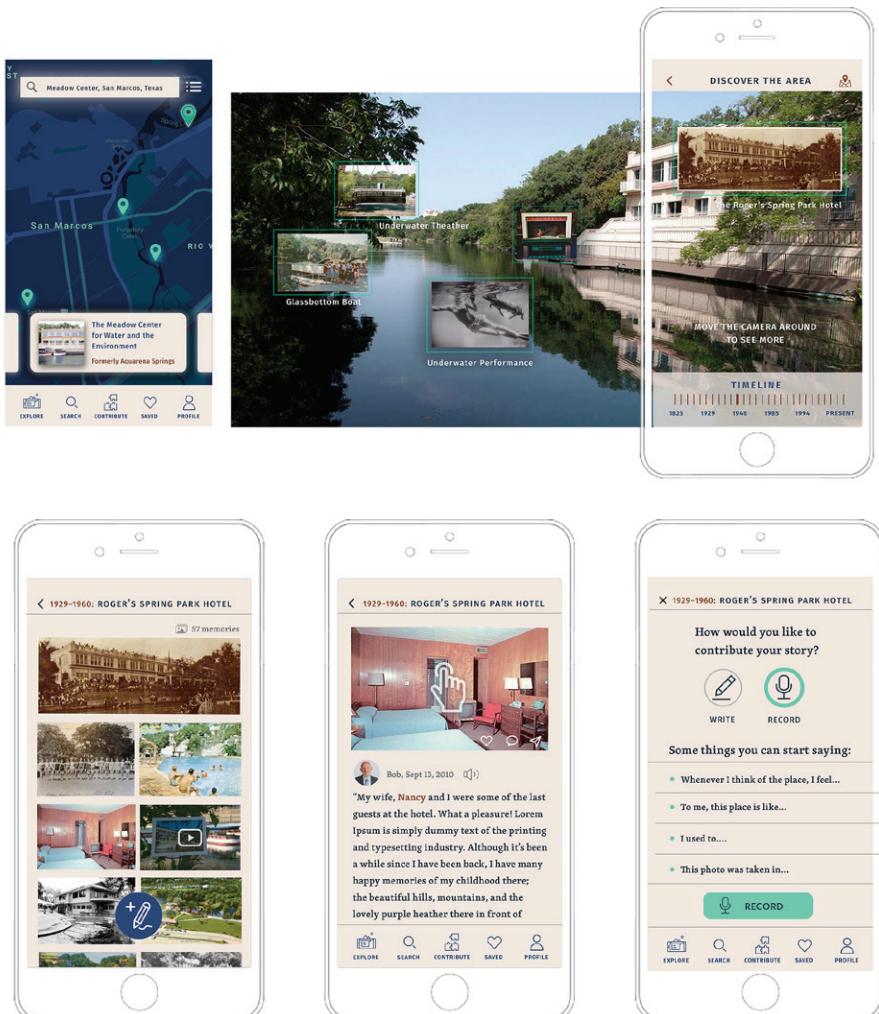


Figure 2. Digital Mobile Application prototypes for *Placed: A Digital Platform* that collectively archive our history with AR. The prototypes display a map, actual user location view with AR, photo gallery, and story/photo contribution pages.

Image Credit: Texas State University, Albert B. Alkek Library, Library Archives

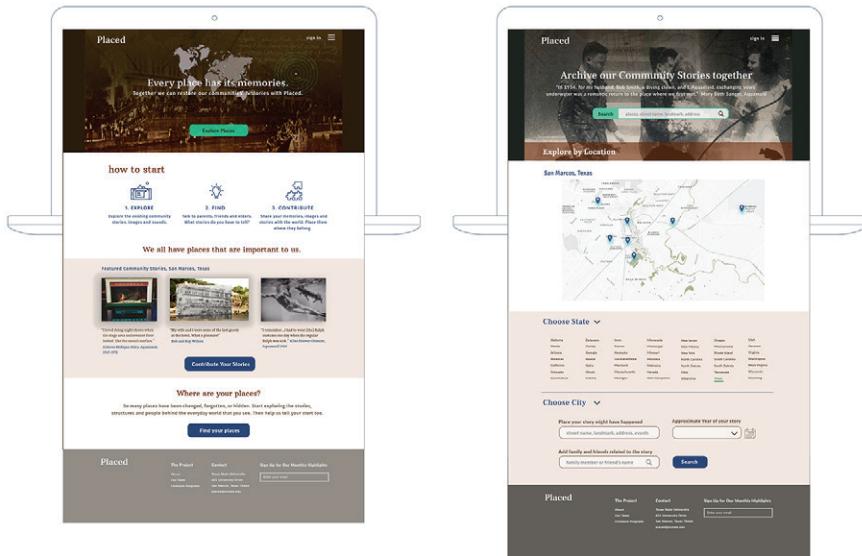


Figure 3. Digital Website prototypes for *Placed: A Digital Platform* that collectively archive our history with AR. The prototypes display a home page and an explore page where users can look for various locations on the desktop computer.

Image Credit: Texas State University, Albert B. Alkek Library, Library Archives

Process: User-Testing with Large Group and Implementation

Using a digital prototype tool such as InVision and Adobe XD, the digital prototype is shared with the entire team, community organizations and general community members. The team discusses feedback from user-testing with general community members and will make necessary revisions. Implementation of *Placed* begins with community leaders and history teachers representing a wide variety of different populations in the San Marcos High School. *Placed* plans on having teachers incorporate *Placed* into the curriculum to bring it to many of the families of San Marcos and involve them in the project of telling their own stories. *Placed* will be introduced as a history assignment that asks the students to interview a family member and collect stories and photos and the students will submit their collected materials to *Placed*. Working with the local high school history program will allow *Placed* to reach out the broad range of the community. There are approximately 2,300 high school students in San Marcos, Texas and about 20,000 high school students in Hays County in Texas.

Conclusion

Placed has a dual purpose: on the one hand, by giving people greater voice and control of their stories and histories, it allows people to more fully possess and inhabit the communities in which they live. It extends these communities worldwide to include their past residents, the families and groups that have contributed to them, and the people who maintain connections of community and affection to places worldwide. On the other, it will address the data needs of local governments and community organizations. Collecting data about communities is essential to fair decision making for *all* presenting communities but is usually both expensive and arduous. *Placed* provides a low cost, high quality source of social and historical data. Overall, *Placed* will improve communities across the nation by connecting citizens with each other, regardless of class, and citizens with beneficial organizations, all while connecting everyone with their shared and unique histories.

Acknowledgement

Photo credits 1) The Meadow Center for Water and the Environment Online Archive, Texas State University, San Marcos, Texas, USA. 2) Albert B. Alkek Library Archives at Texas State University, San Marcos, Texas, USA.

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Exploring the relevance of cross-disciplinary collaboration in enacting social innovation in emerging economies

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Abstract

This work discusses the relevance of cross-disciplinary collaborations in bringing social innovation into effect in emerging economies. It aims to bridge the gap between theory and practice by providing a comprehensive view of the different stakeholders, actions, and activities that occur in the social innovation process. An academic and social innovation practitioner joined efforts to pinpoint those actions that are part of the collective learning journey experienced by people developing social innovations. A case study approach is used to examine the different cross-disciplinary collaborations required in two cases addressing developing country issues. Both examples showcase that in devising social innovation solutions securing trust and cross-cultural understanding requires clear channels of communication. Developing a social innovation that is collaborative and appropriately addresses real challenges requires all stakeholders to be involved. They need to be flexible, agile and resilient to recover quickly from the adversities that they will inevitably encounter throughout an experiential learning process. This work provides a significant opportunity to advance the understanding of the connection points between social entrepreneurship, social innovation, and design.

Author keywords

Cross-disciplinary collaboration; social innovation; resilience; learning process; social entrepreneurship.

Introduction

The last decades may well prove to be a turning point in how governments, institutions, and societies responded to the number and scale of social challenges and disasters experienced around the world. The increasing frequency of human-made and natural disasters are jeopardizing the stability of nations, especially developing countries. World leaders, civil society, public organizations, the private sector, academia, and the people affected by these crises are joining forces to rethink humanitarian response and aid. For centuries, people have acted and embodied resilience through creativity, ingenuity, and practical wisdom, to deal with challenges imposed by nature. For example, communities based in Asia and Africa have transferred tacit and ancestral knowledge over generations enforcing a deep local understanding of indigenous capabilities when leading innovative developments (Abdessemed-Foufa, 2005; Rautela & Joshi, 2007; Shaw, Sharma & Takeuchi, 2009). Therefore, the development of new and redesigned approaches that are multifaceted and cross-sector based is vital to go beyond predictable humanitarian and development responses. These approaches must align with local governments, industries, societies to build efforts that support changing dynamics in human development.

Social innovation (SI) and social entrepreneurship (SE) have been used to address multiple and interdependent socioeconomic issues (Peredo, & McLean, 2006; Sinkovics, Sinkovics, & Yamin, 2014; Weerawardena, & Mort, 2006; Zahara, Gedajlovic, Neubaum, & Shulman, 2009). For the last few decades, an increasing number of researchers (London & Hart, 2004, 2010; Organisjana, Eremina, Gvatua, Kabwende, & Chukwu, 2017; Rao-Nicholson, Vorley, & Khan, 2017; Sinkovics et al., 2014) and practitioners (McKinsey & Company, 2016; Brown, 2016) have studied SI and SE as enablers of social value creation in emerging economies contexts. SI aims to activate, foster, and utilize the potential of the whole society, government, and/or private businesses to generate innovative activities, products, and services that are motivated by the goal of meeting a social need. Its outcomes are predominantly developed and diffused through organizations whose primary mission is social (Andrew, & Klein, 2010; Goldenberg, 2004; Morales, 2009; Mulgan, 2006; Neamtan, & Downin, 2005). SE is another approach for dealing with complex social needs (Johnson, 2000) to benefit society by utilizing and pooling resources across institutional boundaries.

Both initiatives demand a collaborative effort in the learning journey toward developing a social innovation solution. This journey might have different facets depending on the socioeconomic, cultural environment, and institutions of a nation. However, the outcomes aim to satisfy human needs; raise awareness about and open access to human rights; reach a concrete achievement and improvement; create a long-lasting and broad impact; and enhance institutional capacity to learn. Its effects can be seen to develop social capital, social cohesion, empowerment, and democracy; and to cause necessary changes in the relationship and developing cross-sectoral partnerships. Their realm extends from the public and policy level to the academic and scientific study, as its application cuts across all fields and sectors of society. These cross-sectoral

collaborations among the public sector, civil society, and the private sector are crucial to reap their full potential.

Design has been regarded as an approach that, at its heart, seeks ways to conceive a better world. Designers are trained to observe, synthesize, analyze, generate and evaluate hypothetical possibilities where they can (re)imagine the future of industries, cities, and nations. Therefore, the academic and professional community are discussing the role of design in solving intractable problems. For this research, we explore and document the social innovation process to understand the cross-disciplinary collaboration that occurs in two case studies. We demonstrate the interactive process and bottom-up initiatives that drive social innovation, especially in resource-constrained settings.

Research methods

There is a paucity on empirical research in emerging economies regarding SI and SE cross-disciplinary collaboration and learning process. We adopted a case study approach to explore and understand the cross-disciplinary collaborations within the social innovation process in different environments. This approach allowed us to unpack the dynamic present within a single setting (Eisenhardt, 1989: 534). We followed Yin's (2009) suggestions to analyze the qualitative data collected. The following principles were followed: understand the large amounts of qualitative data; integrate similar and related data from various notes; identify key themes or patterns for further study; and develop theories according to the apparent relationships and patterns. We then present and discuss the two case studies; specifically, the findings and importance of cross-disciplinary collaboration in the social innovation process.

Case study A

Social innovation: Financial innovation in the artisan sector

Stakeholders: Organization A [US-based non-profit org]
Organization B [US-based non-profit microfinance org]
Globally-based artisans and for-profit craft companies

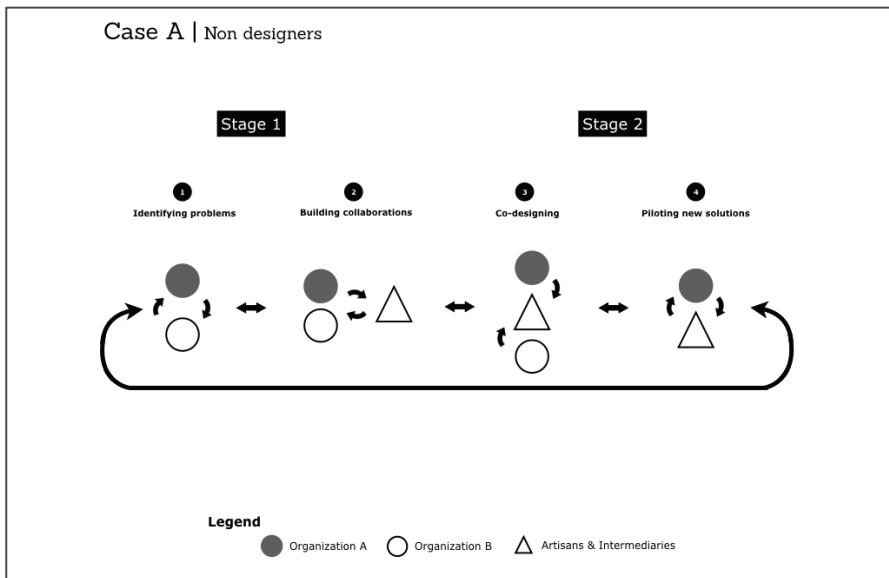
Project team: International development professionals, microfinance experts

Hard & soft skills: microfinance, entrepreneurship, program development, cross-cultural communication, empathy, persistence

Introduction

Starting in 2013, Organization A identified challenges in the global artisan sector in which they could provide support and solutions. Staff encouraged artisan entrepreneurs, and for-profit craft companies which buy and sell artisan wares on the global market to form a partnership alliance with their organization (Fig. 1). Some artisan partners, noting the lack of low-interest small loan opportunities in their home countries, asked Organization A to create a microloan program. Therefore, Organization A contacted Organization B, a global microfinance organization that provides an online lending platform, to co-design a program consisting of three types of loans:

1) working capital for new material and new products; 2) going to market loans to cover costs associated with attending craft fairs; and 3) infrastructure and equipment loans. Interest rates were capped at 5% and loans were required to be paid back within 6-12 months. During the development of this initial loan program Organization A consulted with select artisan partners and announced the opportunity network-wide to garner interest and support.



Identifying problems and building collaboration

In the program's first year, Organization A facilitated only four loans through Organization B's lending platform. They were perplexed by the lack of interest, and asked questions such as: Did we consider the right loan opportunities? Do artisans feel comfortable using an online platform? Do they trust us? They approached Organization B to tap their expertise and to better understand the entrepreneurial goals of artisans.

Organization B placed a microfinance professional within Organization A to address the program's issues and provide fresh insight. Through qualitative research, it was evident that trust and understanding were lacking between artisan members and Organization A. More inclusive communication channels were established to enable a deeper collaboration that honored the perspectives of all parties in the development of loan programs. Once the challenges faced by alliance members were identified the project team was able to engage in a rigorous back-and-forth of problem identification, brainstorming, and idea generation with artisans and craft companies to adjust the existing loans. This stage of the innovation process required transparent communication and persistence to address challenges and find

the appropriate solutions that could sustainably support artisan business growth across a wide range of socio-economic contexts.

Co-designing and piloting new solutions

Through this rigorous process, artisans shared their desire for a more well-rounded financial inclusion program. They were keen to develop life-long skills that would give them the confidence to make sound decisions for their businesses, including training in financial literacy and business practices. A loan program was just the first step toward greater independence and empowerment.

Organization A rolled out a revised pilot program within months of completing the research. New loan structures were prototyped. Loan tenures were extended to accommodate unforeseen challenges. Organization A also committed to exploring related ecosystem gaps (e.g. financial literacy, training and mentoring). During the pilot phase, Organization A continued their outreach to artisan entrepreneurs and cooperatives to explore their unique challenges one-on-one and guide them toward the right loan application.

Outcomes

Today, Organizations A and B have validated and sustained the new program structure. Over 10,000 artisans in 13 developing countries have been received loans. The average loan is \$8,700 USD at 0% interest with a repayment rate of 11 months. Organization A provides business coaching opportunities that allows staff to connect with artisan partners and strengthen their collaboration. Organization A is now on the cusp of scaling and creating systemic change. Still, the innovation process is in constant motion as they discover new opportunities to grow the artisan ecosystem. None of the project team were trained design professionals, yet they devised a sustainable social innovation solution by effectively using soft skills like empathy, cross-cultural communication, and collaboration to underscore their disciplinary knowledge.

Case study B

Social innovation: New-born innovation in the health sector

Stakeholders: Organization A [US-based non-profit org]
Organization B [Vietnam-based manufacturing org]
Organization C [US-based philanthropic org]
Organization D [US-based non-profit design org]
Doctors, nurses and parents

Project team: international development professionals, healthcare technology design experts, manufacturing professionals

Hard & soft skills: product and engineering design, business and program development, cross-cultural communication, empathy, persistence

Introduction

In 2011, Organization A was developing maternal and newborn health projects in Vietnam. For them, establishing partnerships with government officials and private industry was critical to their project implementation (Fig 2). Organization B was one such partner that manufactures neonatal health technologies (e.g., infant warmers, phototherapy devices) for low-resource hospital settings using local resources. Together, Organizations A and B disseminated neonatal devices throughout the country. Yet, through conversations with doctors and nurses they began to discover flaws with the design of their phototherapy device. Concurrently, Organization A was discussing funding support with Organization C to scale their medical devices globally. As these design issues emerged Organization A asked Organization C for a connection to a technical design firm with maternal and neonatal health expertise. Organization C identified a nonprofit design firm, Organization D, which was creating state-of-the-art neonatal technologies for developing countries, but did not have a distribution network. Over the next year Organization C shaped a three-year, fully funded partnership between Organizations A and D to develop and disseminate an innovative phototherapy device across five countries in Asia.

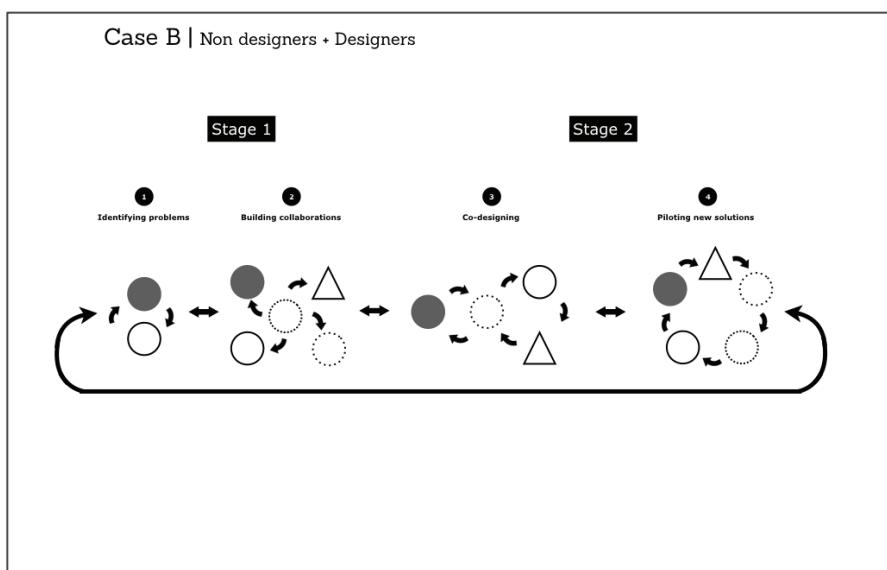


Figure 2. Case B social innovation process

Identifying problems and building collaboration

Neonatal jaundice in term and pre-term babies continues to be a pressing issue in developing nations. Phototherapy works using light therapy to breakdown dangerous levels of bilirubin, a naturally occurring substance in blood that can sometimes build up in newborns and cause jaundice. When Organizations A and B were assessing their existing phototherapy devices they observed that health staff were placing multiple babies per crib who then received insufficient treatment. Equally concerning, some devices were sitting broken in a corner.

Discussions with doctors and nurses across hospitals revealed problems including, staff inexperience with jaundice, limited ability to keep devices clean, and insufficient expertise to repair broken units. Therefore, the new partnership between Organizations A and D was key to propose a new design that was not just technically sound but factored in environmental limitations and staff experience to prevent further product failure.

Co-designing and piloting new solutions

Organizations A and D conducted countless interviews with doctors, nurses, and parents to unearth ideas for a phototherapy device designed to ensure compliance, ease of use, and safety. Meanwhile, Organization B provided feedback on the availability of regional materials to build devices at scale. The partnership became an intense collaboration in which all stakeholders provided unique expertise in the design and development process. Ideas were pursued only to be discarded as new challenges emerged. The commitment to technical excellence forced the project team to be resilient, as they were confronted with many design failures, environmental constraints, and user challenges while designing a state-of-the-art device that could be scaled across many countries. Even though the project had funding to engage in trial and error the arduous process challenged their individual resilience. Yet, their deep commitment to reducing neonatal mortality hardened their resolve to find a viable solution.

The project team solicited the help of doctors, nurses, and parents in the design of the new phototherapy device. Parents wanted a portable device so they could be with their babies more. Doctors and nurses wanted a user-friendly solution that required minimal training and maintenance. This feedback was used to create a viable prototype. Simultaneously, the project team created a phototherapy training program for hospital staff along with an educational program for parents on jaundice and treatment practices. What began as technical design challenge became a social innovation that improved newborn healthcare. Organization A appealed to government partners to become customers, ensuring low-resource hospitals are equipped with state-of-the-art phototherapy and thus, reduce neonatal mortality rates.

Outcomes

It took five years from design to validation and dissemination of the neonatal health device across the five countries. The complex collaboration throughout the different stages of the innovation design process resulted in a product that met the needs of different stakeholders. Today, more than 200,000 babies have been successfully treated for neonatal jaundice across 25 countries worldwide, and the impact continues to grow. Organizations A and B developed a business model for selling the devices and thus, eased their dependence on grant funding.

Discussion

This work aimed to explore the relevance of cross-disciplinary collaboration and how it enacts SI and SE in emerging economies. To this effect, the work examined the key elements that are innate in the social innovation process and social context. We looked at communication, understanding, and resilience as a means to develop inclusive partnerships that unlock social value and change.

Most of the existing research focused either on conceptualization related to issues or on understanding the role played by different stakeholders in social innovation. The two-case studies showed evidence of this embedded agency, where the initial organization provided the foundation for social change. Three findings emerge from the analysis of the social innovation process. The first highlights the importance of transparent communication for the cross-collaboration to be meaningful. Project leaders build trust and goodwill among stakeholders to achieve a deeper awareness of the intentions of each member involved. The second emphasizes that cross-collaboration teams depend on empathy to complement the different experiences, capabilities, and capacities of the team members and to deal with the challenges imposed by the environment. The third exhibits resilience throughout the social innovation process, as stakeholders have to overcome challenges and setbacks through a rigorous problem-solving stage. This resilience allowed stakeholders to deepen understanding, move good ideas forward, and drive transformative social change. The findings suggest that the social innovation process requires constant adjustment and learning. The challenges experienced allowed the different members to gain valuable insight into the quest to build sustainable social value.

Conclusion

The work showed that SI and SE projects require cross-disciplinary collaboration to establish an equal partnership that unlocks social value and change. These collaborations require clear communication among their members to have an understanding of the needs, motivations, and desires of all stakeholders, many who rely on resilience to deal with their socioeconomic issues. This process requires members to build strong bonds with the different stakeholders to achieve trust that subsequently leads to meaningful insights. Professionals and scholars should produce collaborative research that reflects on the learning process that each case has in addressing real challenges in different contexts. The learning process has to display those details that allow project leaders and stakeholders to be flexible, agile and resilient in the face of adversities that they will inevitably encounter.

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4. Cross-disciplinary Paths for Art, Design and Media II

Academic Papers

Interdisciplinary design process of a multi-sensory interface to facilitate learning of basic concepts of trigonometry

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Abstract

This article presents the results of a twelve-month iterative and exploratory design process developed at Universidad del Desarrollo to create a “tangible user interface (TUI)” as a pedagogical tool to learn trigonometric concepts in a meaningful and inclusive way. The objective of this study was to investigate the technological, formal, sensory and perceptual critical variables to consider in the design of the artifact to enhance learning. Principles of the theories of Embodied Cognition and Blended Interaction were included to model an intuitive and collaborative learning experience. Incorporating digital technologies has proved to positive influence performance and learning of students, but the application of TUIs in the classroom setting is still incipient. Trigonometry concepts were chosen as the subject to teach because it is relevant as a baseline for advanced mathematics and for other disciplines such as design. In addition, studies evidence difficulties and challenges in teaching and learning trigonometry in secondary and higher education in Chile. The methodology used was quasi-experimental and mixed, incorporating qualitative and quantitative data collection from Design and Engineering students who participated testing three Intermediate Models and two Prototypes. Testing enabled to progressively increase the fidelity of the prototypes influencing pedagogical effectiveness and enabling the integration of sensory and interactive components. Comparative analysis of Pre and Post-Test results, demonstrate that students’ performance increased by 37.1% after two sessions using the interface.

Author keywords

Interaction; Interdisciplinary learning; Multi-sensory; Tangible User interfaces; Design Process

Introduction

Traditional education systems have rapidly changed in the last twenty years, opening space for the discipline of Design to participate in the creation of more collaborative inclusive methodologies and pedagogical intended objects that encourage participation/interaction of students and teachers. Several initiatives have explored the transfer of design methodologies to educators (Design Thinking for Educators, from IDEO; Danish NGO INDEX: Design to Improve Life®, Design for Change etc.). This shift in education strategies have also been influenced by the incorporation of technology, that positively affects the performance and learning of students (Kepceoglu, 2016; Scarlatos, 2002; Marshall, 2007), enabling new ways for students and teachers to participate and collaborate in the learning process.

In the past two decades, educational technology has gone from the development of software applications, websites, etc. (Dooley et al., 2016; Camilleri & Camilleri, 2017; Van Loon, Ros & Martens, 2012), to learning interfaces that provide direct and "tactile" interaction between the user and the interface. Tangible User Interfaces (TUIs) are those that give physical form to digital elements, enabling the user to directly manipulate digital information with their hands (Ishii, 1997). The use of tangible interfaces positively influences the cognitive process of the user, enabling agile opportunities of individual and collaborative discovery, supporting the formation of hypotheses, improving understanding through the combination of different senses and supporting the rapid evaluation of diverse alternatives (Jetter, Reiterer & Geyer, 2014).

In traditional education, a teacher explains concepts in front of the class, he/she will probably repeat it one or two times as a transmitter, and after that will ask the students if everybody understands. For many different reasons, students who did not understand will stay quiet and in fact will not learn the concepts. Unlike this situation, TUIs influence the course of actions and thought processes supported by experimentation and can provide various visualizing options to enhance the learning experience (Resnick, Myers et.al, 2005). TUIs also enable a better use of haptic resources that we develop when manipulating everyday objects that surround us (Ishii, 2007), making them suitable for a natural and multisensory learning experience.

In trigonometry education, today we can find numerous examples of digital applications to learn and professionally use trigonometry and mathematics. Geogebra (<https://www.geogebra.org>) for example, is a dynamic mathematics software that enables simultaneous visual, graphic and numerical representations of a mathematical object. The representations can be explored in an interactive way, supporting a "learning by doing" approach (Kepceoglu, 2016). However, most of the tools like Geogebra have limitations when considering aspects that are relevant in the world of TUIs, such as having a low entry level for novices and enabling collaborative and embodied interaction.

At the beginning of the study, the research team agreed (based on prior experience and knowledge), that TUIs should very likely be effective as a playful and inclusive tool to support education. This research focused in the teaching-learning of trigonometry, because there is an unexplored potential in

the use of tangible interfaces to understand and relate abstract concepts (Marshall, 2007), which the team considered an ideal challenge to start developing the new research line of Design and Technology at the Design School. The interface designed in this study used the benefits of TUIs in combination with the intuitive and visual learning aspects of dynamic tools such as Geogebra. This combination enables to have low entry limits, use multiple senses, approach intuitively, and encourages collaborative learning through social interaction.

In this article we begin by introducing an overview of relevant theory and literature that motivated and informed our research. Secondly, we describe cognitive and interaction design considerations that framed the project and the methodology used to develop the interface. Thirdly we give a descriptive summary of the designed experience and interface, followed by a review of the iterative prototyping process. Finally, we report learning assessment results and present the discussion and conclusions of this study.

Purpose of the study

The main objective of this study was to investigate (utilizing a user centered method) the formal, perceptual and technological variables to be considered in the design of a tangible educational interface to learn basic concepts of trigonometry. Four specific objectives were defined:

- Determine the content and progression of the didactic experience to facilitate learning through an interactive interface.
- Iteratively design a multisensory interface to facilitate the understanding of concepts of trigonometry in higher education students.
- Investigate the optimal interactions needed to operate the interface correctly and understand the subject properly.
- Measure the impact of the experience on student learning.

Cognitive and Interaction Considerations

The Theory of Embodied Cognition states that the way in which we learn new concepts is based on the previous body of knowledge that we store since childhood. Lakoff and Nuñez (2000), explain that human beings internalize abstract concepts in concrete terms using ideas and modes of reasoning based on the sensorimotor system. The present study took the approach proposed by Jetter, Reiterer and Geyer (2014), which links Embodied Cognition with the HCI field, and calls it Blended Interaction. The cited authors introduce the term Conceptual Blends to explain how users of an interface rely on familiar concepts and the real world when they are exposed to new experiences of digital technology. The mixtures create a new concept from two inputs (cognitive and physical), in this way, the output results in a new concept with a new emerging structure that was previously not available in the inputs. Several authors have postulated that the appropriate combination of previous experiences of the physical and social world, in combination with those already

familiar in the digital domain, enable an interface to be understood and operated more easily (Jetter, Reiterer & Geyer 2014; Hutchins, Hollan & Norman, 1985).

Since many of our concepts are metaphorical, and our conceptual understanding is crucially dependent on the nature of our bodies and the physical environment in which they function (Lakoff, 2009), the design team aimed at escaping from the traditional interaction paradigms of the so-called WIMP interfaces -Windows, Icons, Menu, Pointer- (Gentner & Nielsen, 1996), in order to enhance the use of the body and foster corporal interactions. This would enable to concretize abstract mathematical concepts through the manipulation of tangible components, appealing to the transfer of conceptual metaphors. It was then determined that the TUI should be capable of hosting collaboration among multiple participants, who would build their interaction experience using and enhancing their pre-existing skills (motor, spatial, social and cognitive). With this approach, the experience should activate cognitive processes stimulated and facilitated by design in collaboration with their peers.

As a starting point for this study, the team determined the approach for the pedagogical experience that the interface should offer based on the literature and prior knowledge of Engineering and Design professors. Inspired by the idea that the combination of input of new information with previously internalized concepts produces significant learning (Vygotsky, 1980), the experience was consequently designed taking a constructivist approach, which involves that students learn new concepts based on their prior knowledge (Ambrose, Bridges et al., 2010).

The main interaction design attributes were defined at the first stage of the design process and served as a framework for the development of prototypes and for the evolution of the interface during the design process:

- The interface should be built upon the benefits of integrating multiple peripheral senses (vision, sound, and touch) as a teaching-learning strategy (Shams & Seitz, 2008).
- The dimensions and configuration of the physical components of the interface should be considered as a relevant element of corporal facilitation, since it conditions certain behaviors and defines the ideal number of participants to achieve a meaningful interaction (Hornecker & Buur, 2006).
- Considering that the interface would be a novel system for the users, the interaction should be as "natural" as possible, compromising few cognitive resources to connect evaluation and execution (Jetter et al., 2014).
- Interface design should consider different dimensions and aspects of interaction. Three aspects mentioned by Jetter et al. (2014) were taken into account:
 - Individual Interaction: focused on individual capabilities supported by multimodal elements.
 - Social interaction: group activities subject to pre-established conventions that come from daily life interactions.
 - User Journey or Workflow: definition of a journey that is temporarily ordered constituting the experience.

- The experience should appeal to audiences with different skill levels. The concept of “low limits, high ceilings and wide walls” from Resnick, Myers et al. (2015) offered guidance to strengthen the effectiveness of the interface: an effective interface enables novices to participate (low limits), offers experienced users more sophisticated experiences (high ceiling) and/or offers a wide range of exploration possibilities (wide walls).
- The design should be focused on both the digital and physical aspects (and the interrelation between them) in order to design an adequate hybrid ensemble (Hornecker & Buur, 2006).

Methodology

The methodology of the study was quasi-experimental and mixed, incorporating qualitative and quantitative data collection to inform the development of the design from the perspective of usability and pedagogical effectiveness (Driscoll, 2000; Jetter et al., 2014). The design process was organized using a modified version of the Double Diamond Model created by the Design Council (2014). It considers four convergent and divergent thought cycles (discover, define, develop, deliver). The divergent cycles consisted of literature review, characterization of prototypes, and exploring design options for the interface through user testing with exploratory prototypes that we call “Intermediate Models”. The convergent phases were stages of definition where higher fidelity prototypes were tested based on two co-dependent factors: the content to be transmitted and the integration of visual, auditory, spatial and interactive components. In all cases, the process was highly supported by the observation of users and collection of their feedback to inform design decisions at each stage. The team used the model proposed by Houde & Hill (1997) to define the purpose of each prototype considering three dimensions: the “role” in respect of its use as a learning mediator; the “implementation” to define the technology and form of the interface; and the “look and feel” to consider the sensory and perceptual aspects.

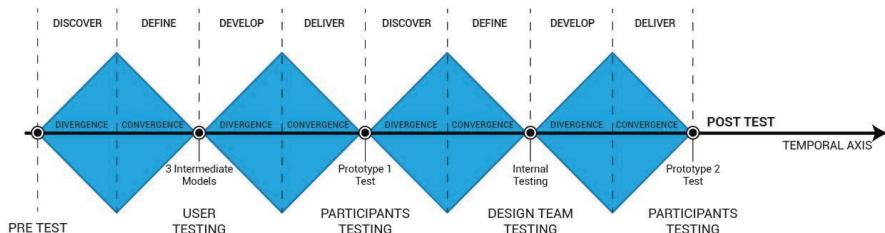


Figure 1. Adaptation of the Double Diamond model Design Council (2014) that illustrates the interface design process.

The three Intermediate Models were interfaces ranging from low to intermediate fidelity. Their objective was to explore options for particular aspects of the interaction that takes place around the interface (ie. collaboration, usability of controls, content sequence, etc.). They were tested with diverse types of users in different group configurations in order to obtain useful qualitative feedback in-situ. The Intermediate Model phase shaped the early design process and enabled the team to make design decisions that led to Prototype 1 and 2.

The two user-testing sessions with Prototypes 1 and 2 were thirty minute-long interactions, guided by a Facilitator. Each session was documented in video, photography and an observation spreadsheet developed by the researchers. In addition, a usability and interface validation questionnaire was applied using a Likert scale from 1 to 9 with criteria taken from the VII version of the Questionnaire for User Interaction Satisfaction (QUIS, Department of Psychology of the University of Maryland in 1988).

A Pre-Test and a Post-Test were compared to measure the impact of the interface on students' learning. Two groups were established consisting of 119 first-year students from the Design and Engineering schools, which carried out the Pre-Test ($n=65$ in Design and $n=54$ in Engineering). Within these groups, 24 students tested Prototype 1 and 2 ($n=10$ Design and $n=14$ Engineering), and constituted the Experimental Group. The remaining students constituted the Control Group and carried out the Post-Test without interacting with the interface.

Description of the experience and interface

Since the main objective of designing the interface in this study was to support the learning of basic concepts of trigonometry, the team defined at an early stage a limited set of concepts to be addressed. This definition was based on the Pre-Test results, literature review and the previous experience of Engineering professors. Having a content framework at the beginning informed design decisions (such as the formal aspects of the interface) and helped develop a coherent pedagogical approach to be used during the experience with the interface. Five thematic modules were defined:

- Module 1: Cartesian plane and polar coordinates
- Module 2: Sine values based on an angle
- Module 3: Cosine values based on an angle
- Module 4: Periodic functions and sine waves
- Module 5: Special angles and trigonometric identities

The experience consists on a group of students that interact with the interface to explore concepts contained in the five Modules during thirty minutes approximately. A Facilitator hosts the experience supported by a script structured in twelve sequential "scenes" that follow a constructivist approach (from the most simple to the most complex). The script encourages students to have clear spaces to err, experiment, explore and collaborate. It also provides guidance for the Facilitator in respect to the moment in which to ask the participants for specific interactions, what questions to ask, and determining the milestones that require an assessment of the understanding level. The underlying idea behind the script is that students are challenged with an open question and encouraged to work collaboratively on their own to solve it, promoting higher levels of thinking (Gilbert & Driscoll, 2002).

The interface provides a graphical visualization and sonic representation of trigonometric concepts, which are explored manipulating physical controllers using different gestures (sliding, pressing, rotating) to modify parameters that in consequence alter both the drawing and sound on a large tabletop screen. The Graphical User interface (GUI) relies on the Unit Circle Model, widely used

in trigonometry (Kendal & Stacey, 1996), which is adequate to understand periodic functions and simplifies the calculation of sine and cosine based on an angle (Mesa & Goldstein, 2017). The unit circle is drawn on the screen, among other relevant graphical representations: sine and cosine values, the current angle, the cartesian plane, the sine wave and textual and numerical values where needed. The parameters of the Unit Circle are mainly modified by a custom-designed controller that we call “The Rotary Wheel”, a thirty-two centimeter ring that can be turned in 360 degrees and controls the angle that is drawn inside the Unit Circle on screen. Additional controllers modify parameters such as frequency and also enable navigating through scenes.

Sound has two roles: First, to highlight relevant information. For instance, when a special angle (0, 30, 45, 60 or 90 degrees, etc) is reached by turning the Rotary Wheel a beep sound is triggered, indicating the user that there's something about that value that is worth exploring and analyzing; The second role is to represent trigonometric concepts as sound (e.g. sine waves).

Prototyping and Testing Process

Several studies in the field of HCI and product design highlight the benefits of iterative prototyping as a fundamental design method (Scarlatos, 2002). J.S. Dumas & J. Redish (1999), point out its benefits: enables to receive feedback from the participants in the early stages of development; guides designers to iterate diverse design options before committing to a particular path; and keeps the design process focused by abstracting the complexities of an integrated design into particular aspects. In addition prototyping balances user feedback with observation of participatory processes: incorporating users into the design process through testing, experimentation, criticism, adjustment, modification and revision (Resnick, Myers et.al, 2005).

In all the versions of Intermediate Models and Prototypes, the common technology elements are: a physical device that integrates mechanical elements and sensors, a software that reads and process the data obtained from the sensors, and a 42-inch LCD screen that graphs the GUI and provides visual feedback based on the data readings.

Intermediate Models

The team designed a sequence of three intermediate models that were tested with 18 subjects, including students and professors from both the Design and Engineering Schools. The goal of the Models was to explore different approaches both for the design of the interface and for the pedagogical experience. The spirit on this phase was that users would become co-creators, by contributing with their feedback, so each user-testing session was followed by an interview where participants were encouraged to freely critique and discuss ideas on how to improve the interface and experience. During the tests, the team documented the interactions using an observation spreadsheet and feedback was collected using a questionnaire at the end of each session. These activities helped to identify unexpected variables and had a significant impact on the development of both the interface and the design of the experience. It helped resolve aspects such as ease of operation, collaboration dynamics, comprehension level of the content, enhancements of the physical

space and progression of the script. A good example of how feedback impacted the development of the interface is the case of the Rotary Wheel: in Model 1 it was designed as a control detached from the main screen (Figure 2). While it performed well from a technical standpoint, it was observed that users had a tendency to touch and indicate with their fingers directly on the screen instead of using the Rotary Wheel. During the interviews, some users suggested that it would be nice to directly manipulate the digital objects drawn on screen, which led the team to integrate the Rotary Wheel on the screen for the following Model (Figure 3).

Other decisions during this phase included: modifying the position and thickness of the Rotary Wheel for better visibility of relevant information on screen, adding additional controls for the users (scene navigation, frequency and amplitude control, visualization of equations), removing/adding scenes and adjusting terminology and style used by the Facilitator.

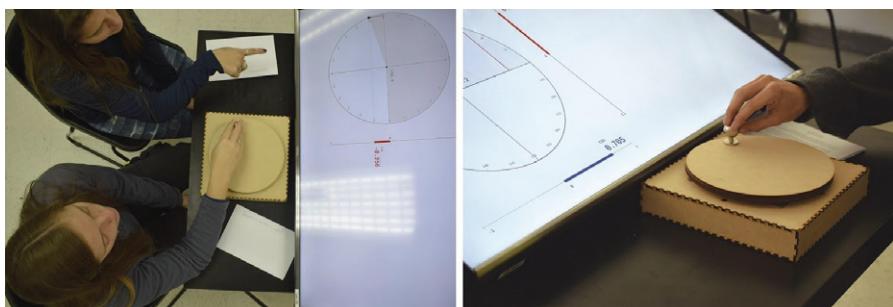


Figure 2. Intermediate Model 1, Rotary Wheel detached from the main screen.



Figure 3. Intermediate Model 2, the Rotary Wheel is now integrated into the screen.

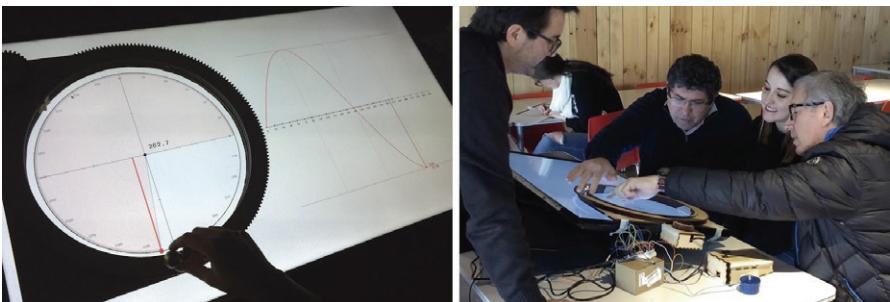


Figure 4. Intermediate Model 3, user-testing sessions with Engineering professors to collect expert feedback.

Prototype 1

Prototype 1 was tested with 31 subjects. The focus of this prototype was to validate the physical configuration, ideal number of participants and the progression and style of the content presented. Feedback was collected with the same tools used during the Intermediate Model phase. The students invited to user-test this prototype conform the Experimental Group, that later participated on a second session with Prototype 2 and a Post-Test, both of which are explained in more detail later in this article. Prototype 1 differs from the Intermediate Models in the sense that it is an integrated interface and an integrated learning experience, whereas the Intermediate Models were more focused on particular aspects and not necessarily on a fully functional device.

In Prototype 1 the controls are built into a physical device that wraps the screen, creating one integrated artifact. The trigonometric concepts are plotted on an LCD screen arranged horizontally and slightly angled. The main control is the Rotary Wheel that controls the angle of the Unit Circle represented in the GUI (Figure 4). A series of secondary inputs (buttons and knobs) control additional system variables, grouped by function: navigation controls, parameter controls and debug controls. Inside the physical device there are a series of electronic components that read the position and rotation of the physical controllers: two rotation sensors, a microcontroller, pressure sensors (buttons) and a linear potentiometer (slider). The data collected from these sensors is interpreted by a custom-built software that performs the graphic and auditory output displayed through the monitor.

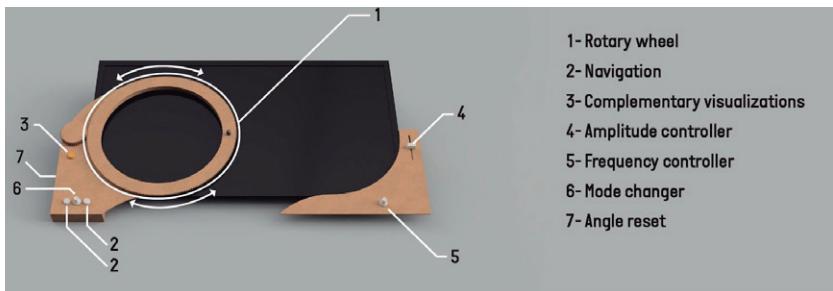


Figure 5. Schematic render of Prototype 1, showing its configuration and distribution of controls.

In the previous stages of development, it was observed that in occasions participants had wrong or imprecise preconceptions of trigonometric concepts, which distorted or even prevented the acquisition of new knowledge (Ambrose, Bridges et al., 2010). To address this issue, in Prototype 1 the script presents terms progressively and detached from their technical term: During the first quarter of the experience for instance, the word "sine" or "cosine" are intentionally replaced by "red bar" and "blue bar". This strategy enabled participants to understand the meaning of concepts before associating them with their name, facilitating the student to incorporate the new knowledge with less resistance.

Observation helped to conclude that three participants was the ideal number to enable a good field of view of the screen and an adequate social interaction. This number of participants tended to promote better verbal and nonverbal communication between users and facilitated collective decision-making when consensus was challenged.



Figure 6. User-testing session with Prototype 1.

Prototype 2

Prototype 2 was tested with 24 of the 31 subjects that tested Prototype 1. The content progression, software and hardware are similar to Prototype 1, described in the previous section. The goal was to enhance the flow of the experience and ease of operation of the interface, so the team focused on the

redesign of the physical device and its constructive fidelity. All the components are integrated into a single structure, thus facilitating the assembly and hiding the electronics inside the structure. The positions of the controls were reorganized while maintaining their grouping according to function. A new control zone for the Facilitator was implemented on the upper side of the interface to keep the screen unblocked at all times (Figure 7). Parts of the Rotary Wheel and the gear connected to the rotation sensor were now made out of acrylic (Plexiglas) instead of wood. This resulted in a smoother and more precise operation given that plexiglas reduced friction and performed better under mechanical stress.

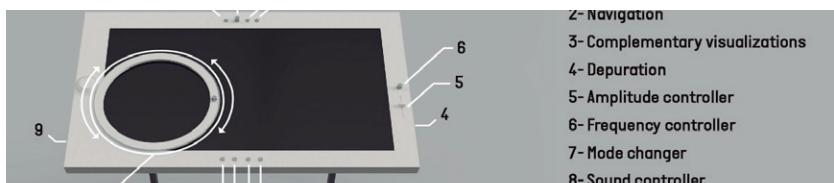


Figure 7. Schematic render of Prototype 2, showing its configuration and distribution of controls.

On Prototype 2 participants experienced the interface standing instead of seated. A stand was designed to obtain a suitable height and angle for the device. This change resulted in a more active, collaborative and fluid interaction, making it easier for users to take turns when operating certain controls. It was observed that all the design enhancements yielded more active interactions, since participants could now focus more on the content and less on the operation of the interface.



Figure 8. Prototype 2 in use, now in standing position.

Learning assessment results

Pre-Test

The Pre-Test was designed and performed at the beginning of the process of this study. It consisted of 12 questions (each one was worth 1 point). It covered the five thematic Modules described previously and included a written introduction at the beginning of the test to even the minimum knowledge level needed to answer it. The test was answered by 119 students: 65 from Design and 54 from Engineering schools.

Results of the Pre-Test were low. As seen in Table 1, of a maximum of 12 total points, in Engineering the mean was 4.35 points (36% yield), and in Design of 2.44 points (20% yield).

Career	Score (12 max.)	Performance (%)
Design (n=65)	2.44	20
Engineering (n=54)	4.35	36

Table 1. Scores and performance obtained by Design and Engineering students in the Pre-Test.

Post-Test

The Post-Test was identical to the Pre-Test and the same data collection and analysis methods were used. The Post-Test was answered by the Experimental Group ($n = 24$, Design and Engineering students), who attended two sessions (with Prototypes 1 and 2).

When comparing the results of the Pre and Post-Test, a significant improvement was observed in the Experimental Group. This result was confirmed by a two sample t-test and a paired sample t-test, to statistically determine the difference between Pre and Post-test results. In both cases the p-value was less than 0.05, so the null hypothesis was rejected and the alternative hypothesis ("True difference in means is not equal to 0") was confirmed. In Design, the mean increase was of 5.0 points, and in Engineering 3.9 (4.46 points when considering both careers). In both the Pre and the Post-Test, Engineering students performed higher than Design students, which was expected considering that in Design there is no formal trigonometry instruction (Figure 9).

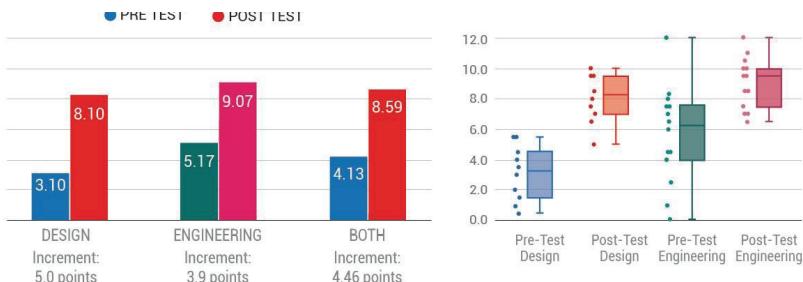


Figure 9. Comparison of mean scores on the Pre-Test and Post-Test results in the Experimental Group (left). On the right, a distribution graph plotting the scores obtained by the Experimental Group on the Pre-Test and Post-Test, disaggregated by discipline.

Discussion and Conclusion

Results from the study endorse the potential of TUIs as pedagogical tools to enhance learning. Participants improved their performance, but most importantly, data analysis showed that their cognitive process was positively influenced, individually and collaboratively, by experiencing the interface (Jetter et al., 2014). Using multiple senses to transfer the content contributed to diversify the access routes to the information during the learning experience. For example, when participants used the Rotary Wheel, they could see how the angle and values of sine and cosine changed, making the abstract visible in a concrete way. Manipulating a physical representation of digital information proved to be beneficial for students to internalize abstract concepts in concrete terms (Lakoff & Nuñez, 2000).

Being able to repeat an action as many times as necessary to understand the phenomenon enabled participants to reflect and agree on opinions, activating their learning process and making it more participatory. In addition, the use of a simple and non-technical language during the experience, facilitated the construction of metaphors that serve to achieve understanding of abstract notions of mathematics (Font, Bolite & Acevedo, 2010). It was inspiring to observe the process of co-creation of knowledge among participants from different disciplines when they discussed while using the tangible manipulative attributes of the interface. Students were able to understand concepts that they did not understand before, corroborate or question their previous knowledge, and learn together using the interface.

At the actual point of development, the project could not entirely resolve the design principle proposed by Resnick, Myers et al. (2005), to offer low limits, high ceilings and wide walls. Today, the interface offers ideal low limits for novices, but does not enable more sophisticated interactions (high ceilings) nor does it offer a very wide range of exploration possibilities (wide walls). Nevertheless, the study confirms that user feedback and observation of participatory processes enhances the iterative design development of an interface.

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Mediating (nonverbal) communication between persons with different cognitive abilities using interactive artifacts

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Abstract

In a time of increasing interest in living and supporting life with mental illnesses, social design offers new tools and solutions for improving human livelihood and well-being. This paper presents student projects completed for a social design course in 2017 and 2018 at the Estonian Academy of Arts that combine traditional crafts with interaction design mindset and skills, resulting in social design work that tackles nonverbal communication with and between persons with different cognitive abilities. The paper compares the development processes of student work for a social design course from two consecutive years, sheds light on the project evaluations, future use in the real life context, and allows for a discussion of the future of design for social interaction between persons with different cognitive abilities mediated by interactive artifacts. The process of involving multidisciplinary instructors team and medical specialist into the design education process is described and reflected on.

Author keywords

Social design; interaction design; textile design; e-textiles; crafting; touch-based interaction.

Introduction: multidisciplinary social design

Electronics merging with traditional crafts as e-textiles in the context of social design have gained more interest recently. For example, touch-based interaction for visual impairment (Giles & van der Linden, 2014) has shown potential in the workshop setting. Giles created space for blind and visually impaired people to be able to create personal interactive art objects. Students at the California College of the Arts have learnt about social design by developing items for people with permanent movement disorders of cerebral palsy (Grant, 2016). Blumenkranz et.al. (n.d.) have developed a kit that would facilitate “the creation of made-to-measure e-textile and wearable interfaces for people with physical disabilities.” E-textiles have also been discussed in the context of cognitive development of people. In his PhD thesis ten Bhömer (2016) created a textile object with a goal to enable a dialogue between a person with dementia and his/her family member. Zhiglova (2018) discussed the socializing potential of the e-textile based interface from the Human Computer Interaction perspective by creating an interactive carpet for engaging with children with Autism Spectrum Disorder.

Opportunities of interactive textile based design for educational tools for children with various spectrums of alertness sensitivities were explored by Kuusk and Nimkulrat (2018). They discussed a social design course in spring 2017 in which the final year undergraduate Textile Design students at the Estonian Academy of Arts developed a set of interactive artifacts for the special-needs educators in the center of mental health of Tallinn Children's Hospital. The first part of this paper reports on the evaluation of the same set of interactive tools after nine months of use and the second part presents the outcomes of the same course taught one year later. In spring 2018 a new group of undergraduate students of varied design specialisms, including textile, fashion, product and leather accessory design) collaborated with a care center for adults with a wide spectrum of cognitive disabilities to develop items for the center's multi-sensory room (Long & Haig, 1992). A multidisciplinary team of tutors guided the student group: smart textile design-researchers, an HCI professional, a tutor from electronics workshop, and occasional feedback was provided by the care center employees. The students were encouraged to “learn to learn” – to develop the ability to learn from experience, to reflect, to self-regulate their learning, to take responsibility, and to assess themselves (Hummels & Lévy, 2013).

This paper attempts to reflect upon ways in which interactive artifacts may facilitate nonverbal communication with and between persons with different cognitive abilities after being put to work in actual environment with actual users. The paper retrospectively looks at student work completed during two consecutive years for a social design course and its future use in the real life context.

Evaluation of the student work used at Mental Health Center at Tallinn Children's Hospital

Interactive textile-based design for education tools for children with various spectrums of alertness sensitivities

Each year the social design project at Estonian Academy of Arts departs from a specific special education partner and their clients. In the spring of 2017 the students of Department of Textile Design brought their design artifacts that they had developed over the course of ten weeks for permanent use in the Mental Health Center at Tallinn Children's Hospital. Kuusk and Nimkulrat (2018) have described the process and resulting interactive artifacts with their motivations and references for developing qualities in detail. Below is a short contextual overview of the interactive artifacts.

UUDU (Figure 1 left) is a tool for color and pattern matching and texture exercises. Its soft hexagonal rotatable wheel divided into color and pattern sections was attached to the top part of the wooden panel painted in the respective colors and patterns, allowing color and pattern matching. In the bottom part of the panel there are rollers with interchangeable textures that allows for sensory awareness exercises (reaching, swiping, grasping).

SHPACO (Figure 1 middle) is a game for learning shapes, patterns, and colors. The surface is filled with soft switches of which each forms a pair of matching shapes, patterns, and colors. The child would find the pairs collaboratively with the instructor and lights would illuminate in case of the correct pair.

TEKK (Figure 1 right) is a multifunctional therapeutic blanket with weighted buckwheat sachets that could be altered and used in respect to the needed pressure or the function of the artifact. As a heavy blanket it provides anxiety relief. As a play mat it could develop balancing skills, mimic a massage, and arouse tactile senses. The herbal buckwheat pillows stimulate smell and tactile experiences.



Figure 1. From left: *UUDU* by Helen Grass and Irina Pommer, 2017; *SHPACO* by Maria Teng, 2017; *TEKK* by Kris Veinberg and Egle Lillemäe. © Helen Grass, Irina Pommer, Maria Teng, Kris Veinberg, Egle Lillemäe, and Estonian Academy of Arts.

After the academic evaluation, the work stayed in the Mental Health Center at Tallinn Children's Hospital for the staff and client's daily use. The next section

will present the user comments and ideas that have emerged after the artifacts had been in use for nine months in the center.

Evaluation of the nine months of use of interactive artifacts in the Mental Health Center at Tallinn Children's Hospital

The previously described three works were delivered to the Mental Health Center at Tallinn Children's Hospital together with their accompanying digital video and PDF instructions of use. One staff member who is a special education specialist at the hospital was personally involved in the development process and took the initiative of introducing the works to her colleagues. The hospital staff member did not receive any specific instructions for documenting the use of the artifacts. They were informed about a possible follow-up request by the researchers in order to evaluate the long-term use of these artifacts created as social design course work. Nine months after the artifacts had been handed over one of the researchers contacted the hospital staff member for an open-ended interview at the hospital. The interview lasted approximately 1 hour.

The special education specialist at the Mental Health Center used the artifacts designed by the students continuously, in average 1-2 days a week. At the time of the evaluation *UUDU* was stored in her office where she meets her clients who are children with cognitive disabilities daily. She uses *UUDU* with a client whenever his/her cognitive level allows, mainly reaching sensory level communication. She used the different structures of *UUDU* and persuaded the client to attach and detach the textile surfaces on to the rollers with the Velcro. Children like Velcro in general. Some clients preferred arranging the patches, whilst some other preferred creating chaos with them. *UUDU* helped the clients who otherwise had struggled to maintain their attention. According to the specialist, *TEKK* was mainly used by the parents and a psychologist. She noted that the separate buckwheat pillows had been removed from the blanket to be used with smaller children. Sometimes they placed the pillows on the laps of the children, sometimes next to them. Children had also played hide-and-seek by using the sachets of the blanket. Therapists occasionally hid things into the sachets and children looked for them. *SHPACO* found less use at the Mental Health Center because the electronics had stopped working. It was also not working by the time of the visit.

According to the special education specialist, the items were interesting to the children during the nine months of use. As the clients saw and interacted with the artifacts maximum only once per week they have not lost their interest in the artifacts. Therapists also used the items in different ways, inventing new activities to play with the children. They alternated the use of the artifacts and in fact, the artifact was used only as a small part in the larger activity and goal of the session, so there was a lot of variety.

Over the course of nine months *TEKK* and its elements were used the most. Children found multiple ways of interacting with the artifact: building towers, playing pillow fight, and play hide-and-seek. Its multi-functionality generated the open ended and multipurpose use. It allowed for the creation of a mess or the organization of the space, which can be a very important exercise, particularly for autistic children.

Besides the therapists and other staff members, the items have been used by the parents of the clients. They are used for rewarding for evaluations and milestones.

For further development the special education teacher suggests to think of solutions for children to bring some of the educative tools back home with them.

Process of Designing Interactive Learning and Therapy Tools

In spring 2018 the social design course started again with a new special education partner and their clients. In the course, the groups of textile, product, and leather design students collaborated with the Support Center Juks in Tallinn. The organization serves the Social Welfare and Health Care Departments of Tallinn. It offers social services to intellectually disabled people and supports people with special needs to cope maximally in everyday life, vocational trainings and working life (Tugikeskus Juks, 2018). The Support Center had recently started accepting people with autism spectrum disorders and proposed that the focus of the collaboration with the students would be on a sensory room for their autistic clients.

The duration of the course was ten weeks. At the start of the course the tutor briefed the group of students about the principles of social design, examples of the previous year's student work, and information about the specific special education partner. The context of autism and various spectrums of alertness sensitivities were new to all participants. The students could form pairs or work individually. Out of nine students enrolled in the course, three decided to work individually and six paired up forming three groups. Five of the participating students were of Estonian background and the other four students came from various places in Europe. In the second class the group of the students together with their main tutor visited the Support Center. During the visit the staff of Juks provided the students with an overview of the work and environment at the Center and gave a lecture about autism spectrum disorders and guidance regarding some main directions to follow. The students were briefed about the general safety issues concerning people with autism, for example to avoid sharp edges where the users could harm themselves. Throughout the course the students met regularly with the main tutor as well as an expert in electronic prototyping. The electronic prototyping consultations were added to the process based on the experience in the previous year in which the technical issue had become a fundamental issue for a therapeutic tool to properly function. The students had one feedback session with the staff of Juks midway of the project and a final evaluation in which the academic tutors, Juks staff as well as potential clients participated.

The following section will showcase a selection of student projects completed for the social design course in 2018. The authors selected the projects based on their differences in idea, functionality and execution.

Seven Prototypes of Interactive Learning and Therapy Tools

Using the opportunities that textile and electronics can offer in conjunction with the needs of various spectrums of autistic sensitivities introduced by the

special education teacher at Juks, the students developed learning and therapy tools that the education specialists can use in their daily work with their clients.

Friendly Scarf

Friendly Scarf acts as a huggable friend and is meant to calm down, relieve stress, and give a safe feeling to the wearer (Figure 2). It is made of soft velveteen stretchable polyester-cotton fabric whose texture invites relaxation and comfort. The scarf integrates six vibration motors that activate when a snap button is closed. It encourages the user to practice eye contact (as it can be a difficult task for some people with autism) with the dog-looking end. The scarf has several alternative ways of wearing: on the shoulders, around the neck, over the head, covering the back etc. The two sides of the scarf are of different colors.

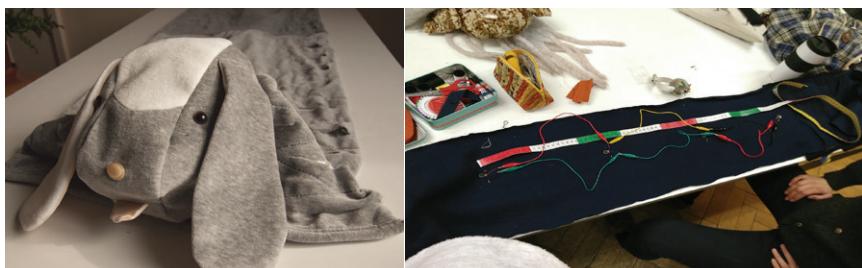


Figure 2. *Friendly Scarf* and a moment from its creation process by Indré Milašiūtė and Laura Rusanen, 2018. © Indré Milašiūtė and Laura Rusanen, and Estonian Academy of Arts.

To finalize *Friendly Scarf* the paired students combined their knowledge in textile materials and tools, such as machine and hand sewing, with their understanding of e-textiles to integrate electronic components, such as vibration motors, Arduino, battery, wires, etc. onto a textile substrate.

TELK

TELK ("telk" means "tent" in Estonian) is intended to be a calming space for the clients of Juks where they can relax and stimulate their senses by touching different textures. The students' creative intention is to give the user a feeling of staying under water. A projector LED night lamp fills inside the tent with calming ocean waves and sounds. The tent which hangs from a wall has 11 jellyfish. Five jellyfish are attached to the fabric next to the wall and six others to the fabric covering the other side (Figure 3). When touched the jellyfish vibrate subtly and show a colorful light.



Figure 3. *TELK* in daylight and darkness by Karolin Innos, Lisandra Türkson, 2018. © Karolin Innos, Lisandra Türkson, and Estonian Academy of Arts.

TELK uses traditional textile skills of hand sewing to work with soft materials in a variety of textures and surfaces such as fabric, leather, metal grid, velvet, synthetic fur and integrates various electronic component such as vibrating motors, LEDs, fiber optic cables, and conductive thread.

Moodi

The stimulating game helps the client to learn and interpret the core emotions based on different facial expressions. This game consists of base faces and three facial parts of eyes, nose, and mouth. The user gets vibration feedback by finding matching couples and connected them. The elements are made of different soft textures such as cotton, wool and various types of fabric, using craft techniques such as hand sewing and crochet. The eyes are filled with dry rice and beans. Battery-powered vibration sensors are embedded in the fabric elements using conductive thread and conductive velcro to generate tangible feedback to the user. All related pairs can be attached to a blanket and used as a learning aid.



Figure 4. *Moodi* by Aylin Hackenberg, 2018. © Aylin Hackenberg, and Estonian Academy of Arts.

Off Line

Off Line is a kit that helps people with anxiety to relax. Based on her personal experience the student observes how people act when feeling anxious. She noticed a behavior of tearing papers, tissues in the pockets, and in general the habit of touching and holding things (keys, phone, hairbands, coins, lighter, etc.) in the pockets. Inspired by that, she designed a kit of six small artifacts that fit into one's hand and potentially release anxiety. Two of the artifacts include electronic components. The artifacts have four different textures and shapes.



Figure 5. *Off Line* by Ann Müürsepp, 2018. © Ann Müürsepp, and Estonian Academy of Arts.

Materials of various tactile qualities were used to create *Off Line* including wool felt, foam, silicon, and Velcro. Programming and prototyping skills are important for the making of these artifacts.

MoveColour

MoveColour is a touchable light-playing board for people with autism spectrum disorders. This product is for increasing their ability to concentrate and memorize. It is also a pleasurable help for creative thinking and self-expression. There are different ways to play with it: the client can play with it alone or with the teacher.

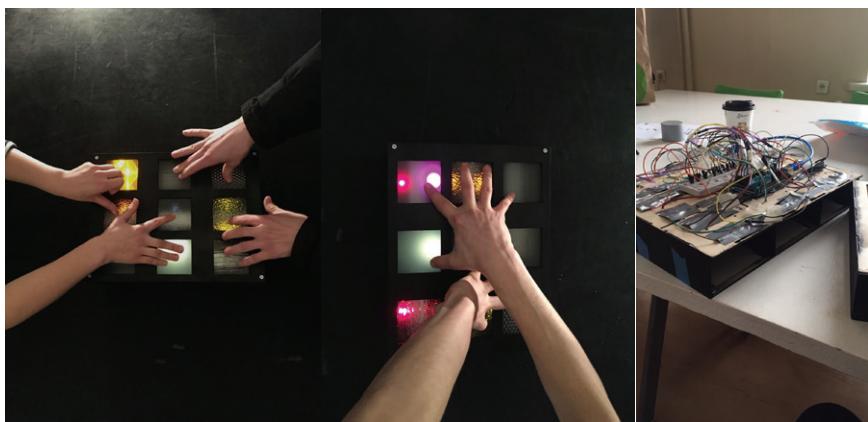


Figure 6. *MoveColour* by Julien Hac, Maarja-Liis Raamat, 2018. © Julien Hac, Maarja-Liis Raamat, and Estonian Academy of Arts.

Although *MoveColour* had used traditional textile tools such as needle, crochet hook, and sewing machine in its ideation stage, for its production it shifted to the use of digital tools such as Arduino, Solidworks, Illustrator, Indesign, Aftereffects as well as hard materials like wood and plastic and heavier tools such as the laser cutter, bandsaw, metal saw, metal guillotine cutter, handsaw, sanding machine, sandpaper, clamps, spray paint.

The skills the students pointed out that while the use of craft and digital skills are crucial for the execution of the project, soft skills including problem solving, communication, empathy, patience, creativity, and English proficiency.

Initial feedback from Support Center Juks

While handing over the artifacts to the center Juks, the staff and clients were optimistic and hopeful about the new tools arriving to their sensory room. The students demonstrated each piece and left video as well as PDF instructions together with the artifacts to the center. The immediate feedback was all positive.

However, after 4 months sensory artifacts made of hard materials had been removed from the sensory room as the room had to accommodate some newly arrived over stimulated (aggressive) clients to calm down. These clients could harm themselves and/or others. Therefore, anything that might potentially cause injury became unsuitable for the sensory room, which is meant for people with a broad autistic spectrum. Generally, the staff of Juks saw soft sensory artifacts more beneficial.

The clients really liked *Friendly Scarf*, However, when the artifact was used constantly, it unfortunately stopped working rather soon – it did not vibrate anymore when the snap buttons were closed. *TELK* has to be removed from the space because the over stimulated client might harm himself and damage the artifact. *Moodi* was with a client to learn emotions; he found some of the

expressions funny. *Off Line* was used with some clients who liked or disliked the individual artifacts. The staff of the center did not get to use *MoveColour* after the presentations as it turned out to be a bit too complicated to start and play.

Discussion and conclusion

The social design course at the Estonian Academy of Arts is an example of an interdisciplinary course allowing students in various design disciplines to learn directly from real life practice that opens up the applicability of their specialisms in a new context beyond what they are used to. By dealing with a certain group of users who may not be able to articulate how they feel about the design artifacts, students are challenged to learn to observe and be sensitive to information they have received.

The presented student work from the two consecutive years serves different target groups, however, follows a very similar design process of rough prototyping, discussions, iterative prototype refinement and presentation. The main tutor remained the same person. Additionally the second year included additional electronics tutor to assure the technical support throughout the project. The outcomes differ in their inclusion of electronic components (Table 1).

	2017 project with Mental Health Center, Tallinn Children's Hospital	2018 project with Support Center Juks
Target group	Children with different alertness sensitivities	Adults with autism spectrum
Duration of the course	10 weeks	10 weeks
Instructors' expertise	e-textiles + special education teacher from the center.	e-textiles + electronics prototyping + staff of the center.
Works including electronics / total works	1 / 3	5 / 5

Table 1. Comparison of the two Social Design courses at Estonian Academy of Arts.

Based on the nine-month evaluation of the 2017 project presented in the first part of the paper, technical issues arose in artifacts using electronics. The situation was probably due to the lack of time to refine the prototypes into a robust level, where they could securely work as products. As the items need gentle treatment or occasional maintenance (as can be expected from

prototypes) the context of mental health institutions might not be the best location for such items. The clients might not have all the sensitivity to treat the artifacts gently. The staff might not have the time or skills to maintain the artifacts accordingly. The authors hoped to improve the level of electronic solutions in the prototypes by involving an external electronics consultant but the works from the following year showed the same tendency when reported back after a short time of use.

Students quite often underestimate the time needed to complete a certain project. Also the short timeframe did not provide them with enough time for testing and refining the ideas before delivering their work to the client. The class could reach more finished and durable artifacts if the course lasted longer, for example 15-20 weeks. This would also allow more interaction with the partner institution to discuss, share and test the work in the actual context.

While the duration of the course is a key factor to achieve refined and durable prototypes, one interesting point that reveal in the 2018 course is the fact that several sensory artifacts had to be removed from the sensory room due to their potential harm to an over stimulated (aggressive) client. This is an important lesson learned for designing products for people with special needs. While each individual person has particular cognitive disabilities, designing for a care center and their clients mean that every single individual's cognitive ability and inability needs to be taken into consideration. An artifact designed for these people have to be 100% suitable for all.

The project has been a great real-life experience, to work with clients of extremely different backgrounds and various abilities. The students also enjoyed making social contribution and seeing their work in real use. Estonian Academy of Arts, Textile Design Department, continues to host a similar subject. In fact the collaboration currently running is in collaboration with Porkuni boarding school for children with special needs.

For the improvement of the multidisciplinary collaborative project between students and care providers, the long-term evaluation of the interactive artifacts mediating communication between persons with different cognitive abilities is essential. Items that beautifully seduce the audience during evaluation might have the opposite effect in daily life in care center and *vice versa*. It is important to understand, document and share the insights in order to develop more meaningful and useful developing tools. This social design course in the future may be designed in a way that a new group of students will have an opportunity to redesign or refine the prototypes that have been in use in either the Tallinn Children' Hospital or Support Center Juks, generating a new design iteration that possibly results in a more refined and more durable products that serve their users well.

Acknowledgments

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Transdisciplinary collaboration as a new phenomenon in the Estonian design field

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Abstract

The Estonian design field is in an era of remarkable change, as the field is broadening from traditional design products and graphics to new and mostly intangible subject matters. As these new subject matters are more complex, they require increased collaboration, not only within the design discipline but across disciplines. With these changes come discussions of design's disciplinary identity, which is the aim of the current study. This paper focuses on the emerging phenomenon of transdisciplinary collaboration, in which design is in the role of innovation facilitator. To discuss this phenomenon more in-depth, the paper presents a case study of Alexela Oil, a chain of petrol stations, which partnered with two Estonian universities to explore possible visionary transformations for their business in the quickly changing and complex field of energy supply. The paper explores the collaboration through a disciplinary prism – the teamwork was built on a transdisciplinary approach. The dynamics of three different teams of designers and engineers are studied as they merged their capabilities in a unique way, team by team. This case study shows that the collaboration of experts with different backgrounds gives new, innovative impulses to the design discipline, and has created new hybrid knowledge forms, which may be a way to increase overall resilience.

Author keywords

transdisciplinary, collaboration, emerging design practices

Introduction

The problems our society is currently facing are increasingly complicated and interdependent. This ongoing process forces the research and design communities to look for new ways to deal with these complexities, as the previous approaches have turned out to be insufficient. One of the growing concerns is that professional practices are operating in professional silos, and the lack of collaboration and knowledge sharing is a restraint to successfully tackle contemporary issues, which are not isolated to particular disciplines, nor are they predictable (Klein 2004). The scope of these phenomena, with non-linear dynamics and uncertainties, extend across domains, and therefore need new research and design settings where transdisciplinarity is principal.

During the last decades, design has been expanding to new geographies by changing its nature from visible and touchable to invisible and untouchable. Redström and Wiltse (2015) claim that design has been continuously widening “its scope of concern and intervention from products to processes, experience, and entire product and service ecologies”, and that design does not exist in isolation, but as part of “the intricate social and material fabric of people’s lives.” Manzini (2015, pp 29-31) analyses how social innovation, together with technological innovation, has been changing the design field. According to him, design by its very nature bridges the gap between social and technological systems, and as these two are going through a deep-reaching transformation, therefore design could not avoid being transformed at its roots.

If the design practise itself is under constant disruption (Binder et al. 2011 p 22), the role of the designer is transforming accordingly. Valtonen (2007 p. 81) claims in her doctoral thesis that industrial design is a professional practice that is equally affected by social, political and economic factors, and the rapid changes in Finnish context transformed the entire perception of what industrial design is and what its strategic benefits are. Lawson and Dorst (2009) emphasise that while design practice is changing quite rapidly, “the designers might find themselves in the position that they have to re-invent the very core of their professional life.” Bremner and Rodgers (2013) call this “the crisis of professionalism” from several different perspectives, including professional, cultural, technological and economic forces, and therefore they characterise design by “fluid, evolving patterns of practice that regularly traverse, transcend, and transfigure disciplinary and conceptual boundaries”.

The critical transformations of design disciplines make the discussion timely, as these changes require conceptualisation of design’s changing nature and emerging practices. One of these emerging practices is a transdisciplinary approach, which deals with complexities, explores new and uncovered areas, produces hybrid knowledge and provides a platform for disruptive innovation. This paper takes the first step to describe and conceptualise Estonian emerging transdisciplinary design practice and discuss how it is building resilience in the current era of uncertainty and complexity. Estonian design as a disciplinary practice has not been researched so far, and this has led the new practitioners to face uncertainties in their professional careers. The analyses and conceptualisation of the emerging practice could delineate the complex and changing design scene and help professionals to understand their roles more clearly.

This paper has four parts: first, the concept of transdisciplinarity in design is introduced, then the current Estonian design context is explained and the relevance of transdisciplinarity in this context is discussed. The third section of this paper presents the case study of Alexela, and the fourth section discusses the phenomenon of transdisciplinary design practice in Estonia.

A new approach – transdisciplinarity in design

Blevis and Stolterman (2009) characterise disciplinarity as “an approach to a particular problem space using a single collection of methods within a single domain of expertise”. Transdisciplinarity is not a new discipline in itself. It transcends disciplinarity by having a broader goal and by using collections of methods and range of domains of expertise. In order for a scholar or practitioner to be transdisciplinary, they need a broad perspective while remaining “disciplinary, multidisciplinary, or interdisciplinary in terms of approaches to more specific sub-problem spaces” (Blevis and Stolterman 2009). Although researchers make clear distinctions between inter-, multi- and transdisciplinarity, most of them do not see any opposition between these but consider them complementary. One of the key authors of transdisciplinarity, Basarab Nicolescu (2014), explains these differences clearly: “multidisciplinarity concerns itself with studying a research topic in not just one discipline only, but in several at the same time. Any topic in question will ultimately be enriched by incorporating the perspectives of several disciplines.” Interdisciplinarity transfers methods from one discipline to another. Both multi- and interdisciplinarity have their goals within the framework of disciplinary research. Transdisciplinarity’s goal is “the understanding of the present world, of which one of the imperatives is the unity of knowledge” (Nicolescu 1996). In very general terms, “trans” means moving between, across, and beyond one state to a new state. More specifically, McGregor (2014) sees transdisciplinarity as “moving back and forth between disciplines as well as moving across and beyond disciplines to engagement with the rest of the world, to a new state or a new place”.

The origin of the term “transdisciplinarity” is in the literature most often traced back to the early 1970s, specifically to the OECD conference in Paris (Klein 2004). Since then, several researchers have pushed this concept further (e.g. Lawrence, Després, Nicolescu, Klein etc.) and today the field has widened significantly. Klein (2004) explains that the widening of the term is because “it is linked with comprehensive paradigms (e.g., general systems, feminism, Marxism), broad interdisciplinary fields (e.g., area studies, cultural studies), and synoptic disciplines (e.g. philosophy, geography, religious studies)”.

An important aspect, why transdisciplinarity is seen as valuable, is its ability to support innovation. As Darbellay (2014) argues, transdisciplinarity “provides space for the incubation of new ideas through the introduction of nomadic concepts, theories and methods located between seemingly separate disciplinary spaces”. Innovation happens because the focus of transdisciplinary research is on new areas on the periphery of the disciplines, and these areas are approached through the creative recombination and hybridisation of disciplinary methodologies. This innovative dimension is of particular interest to several researchers and to society at large, and this forces us “to rethink its foundations and, particularly, its ambiguous relationship with disciplinarity” (Darbellay, 2014).

From the literature of transdisciplinarity, the questions of disciplinary identities are often discussed and problematized. Darbellay's (2014) research of the interdisciplinary practices in Swiss universities shows that although the terms inter- and transdisciplinarity in the researched community of researchers were used, these terms as conceptual tools are not systematically discussed, negotiated or co-defined. This lack of conceptual thinking is seen as one of the vectors of "incomprehension and difficulty in the development and implementation of inter- and transdisciplinary projects". He points out that the failure of negotiating concepts in advance is one of the potential obstacles to run an interdisciplinary collaboration smoothly. This observation supports the need to describe and discuss the concept of transdisciplinarity, not only for this academic conference but for the community of transdisciplinary designers in Estonia.

Design's disciplinarity is a topic of increasing interest among several design researchers. As design's subject matters and its methodologies transition, the change of its disciplinary nature and boundaries is the focus of growing discussion (e.g. Manzini 2015, Dorst 2018, Dykes, Rodgers and Smyth 2009; Bremner and Rodgers 2013). Multi-, inter- and transdisciplinary practices force the design field to define over and over again how the boundaries of design's professional identity are constituted. New, emerging design practices that deal with new subject matters and transcend to new and undisciplined areas make the question extremely interesting and timely.

In the emerging design practices, Manzini (2016) distinguishes expert design (professional designers who are endowed with specific design skills and culture), diffused design (the natural human ability to adopt a design approach) and co-design (the design process engaging a variety of disciplines and stakeholders, including final users and design experts). He looks at co-design as a process with a transdisciplinary nature, but leaves the discussion open about the expert designer's identity and role in the process.

According to Dykes, Rodgers and Smyth (2009), the work of a transdisciplinary team is innovative, represents new knowledge, concepts and artefacts and signifies a new type of practice that is a combination of disciplinary expertise, fused together to form a newly unified hybrid form. Transdisciplinary design combines diverse disciplinary concepts to focus upon a particular context and explore new questions instead. The resulting hybrid perspective is at once between, across and beyond any one individual discipline.

From the middle of last century, design researches have been actively discussing the differences of science and design as well as describing the discipline of design (e.g. Simon 1969, Cross 2007, Lawson and Dorst 2009). Karlsson and Redström (2015) claim that design's approach to complexity is different from science, as science typically approaches through unpacking a complex whole into manageable parts. Design does the opposite in resolving societal challenges by bringing together a meaningful whole. They claim that this "putting back together again" process is far from trivial, but requires a different mindset from the start. In this paper, this way of working together is seen as one of the basics of transdisciplinary design. Transdisciplinarity involves traversing disciplinary order and deals with undisciplined areas. The focus of this article is to study this phenomenon that adopts the leading methodological framework from the design field, but synthesizes others and therefore is called transdisciplinary design.

Emerging transdisciplinary phenomenon in the Estonian design context

The Estonian design field is in an era of remarkable change. At the beginning of the 1990s, there was significant turbulence as the country restored its independence, and the replacement of socialism with capitalism led to the deconstruction of existing design arrangements. This transition had enormous consequences for Estonian professional design practice, and the simultaneous arrival of digital technologies amplified the impact. A considerable number of designers lost their jobs in huge Soviet factories and could not find their place in these changed circumstances. Overall, this altered the whole perception of the design profession, as designers started to work on their own and established the first small design studios.

Almost 30 years later, the Estonian design field and design practices are still in the process of change, following similar patterns in other countries. The field is broadening from traditional design products and graphics to new and mostly intangible subject matters, like services, visions, strategies and policies. These changes are documented by a few recent papers that map the Estonian design field from an economic perspective (Veemaa, Puolokainen, Varblane and Trumm 2018, Eesti Konjunkturiinstituut 2018). The development of a new Estonian Design Strategy has intensified the vivid discussion on designers' core competencies and professional identity, as the changes in the design discipline are still ongoing and there are disagreements stemming from educational and professional backgrounds. Therefore, it is essential to discuss these changes and conceptualise the discipline in these new circumstances, as this has not been the focus of any previous study. This bigger professional transition calls forth the discussion of design's disciplinary identity, and the current paper aims to contribute to that discussion.

This paper focuses on the emerging phenomenon of transdisciplinary collaboration, in which design has the role of innovation facilitator. The phenomenon of transdisciplinarity has emerged in the academic setting of the Design and Technology Futures (D&TF) master's degree curriculum. This 2-year master's degree program is built to combine design, engineering, future thinking and entrepreneurship. The program was founded in 2010, originally named Design & Engineering, and it is jointly run by the Tallinn University of Technology and the Estonian Academy of Arts. D&TF focuses on tackling complex contemporary issues through the emerging possibilities of design and technology.

As part of this master's program, the design studio research projects are intended to develop the capability to tackle contemporary challenges and to provide a pre-innovation set-up for the partners of academia. The challenges in the program are presented in an open format, encouraging the students' personal creative development and self-expression. Stress is made on exploratory and experimental front-end development, including analysing the problem on the ground, noticing and articulating the opportunity, generating solution ideas, prototyping, testing and validating concepts. Students are not given concrete problems to solve; instead, they work their way into complex challenges where they are trying to find room for attractive and promising interventions (D&TF 2018). D&TF is focusing on the fuzzy front-end or pre-development stage of innovation, where new possibilities are explored and

researched and where the new solutions or even types of solutions are not yet known. While in traditional design and engineering disciplines the task is given with a defined outcome (e.g. to design a new chair), D&TF aims to explore the challenge or issue from different perspectives and even from new and hybrid perspectives uncovered during the project. This setting has been researched in this paper from the transdisciplinary approach to question disciplinary boundaries and to explore the possibilities of transcending the knowledge, experience and practices of different disciplines in unknown settings and situations.

During this century, and similarly with the rest of the western world, the design field in Estonia has enlarged its subject matter from products and graphics to more immaterial end-results like systems and services, but still, these practices tend to stay into the framework of the design discipline, where design-centred knowledge, skills and experiences are practised. D&TF aims to push the boundaries of the design discipline outside of its classical form to the field where other disciplines and solutions have not worked. This aim is in line with McGregor's (2014) conceptual "blind spot" as a disruptive innovation that starts from an unexplored area of study. This is new in the Estonian context, mostly because of the overall economic context with the majority of industry focusing on providing sub-contracting services and not on developing their brands, products or services. There have been very few examples of radical innovation, meaning establishing new spheres of business or product/service categories, by Estonian companies. Therefore, D&TF can be considered a new transdisciplinary phenomenon in the fields of Estonian design and engineering.

Tackling the energy challenge: the case of Alexela

To describe this transdisciplinary phenomenon in more detail, the paper presents a case study of Alexela Oil, an Estonian chain of petrol stations, which partnered with D&TF to explore possible visionary transformations for their business in the quickly changing and complex field of energy supply. The paper explores the collaboration through a disciplinary prism. This project was set up as transdisciplinary with three separate teams working in parallel. Each team consisted of three master's students with different disciplinary and cultural backgrounds. The work during the project was documented by students and by the author of this paper. This case study focuses on exploring how the teams were working together to tackle the super-complex problems Alexela is facing and how these complexities could be turned into early-stage innovation practices.

Alexela Group operates in three main areas: energy, the metal industry and property development. Alexela Energy (part of Alexela Group) is the largest energy supplier based on private equity in Estonia. The history of the company dates back to 1964, when the Alexela Energia Reola Liquid Gas Terminal was built. Today, Alexela Energy offers innovations through simple and economical solutions for the liquefied petroleum gas (LPG), electricity and natural gas markets. Alexela operates 62 petrol stations, among these 58 are automatic stations (Alexela 2017).

The project faced two complex trends affecting Alexela's business and required intelligent and resilient solutions. First, petrol stations are focussing on selling fossil fuels, which are not considered sustainable for the future of the planet.

Secondly, the transportation sector is a major CO₂ producer, while at the same time the need for transportation is growing. Alexela's collaboration project with D&TF, called Powering Tomorrow, aimed to shift the understanding of energy from invisible support to meaningful power for the future. The transdisciplinary design and engineering teams were to analyse Alexela's contexts of energy use and then introduce new concepts for products, services, systems or environments.



Figure 1. Team Välk's work in progress. *Photo: Evert Palmets*

As Table 1 shows, the outcomes of the projects varied significantly, although the process was similarly led by design thinking. All three teams started with analysing an existing context and situation. In collaboration, they mapped the petrol stations in Tallinn by photographing the sites and by observing people's behaviour in the stations. All three teams analysed the data from different perspectives.

Name	Outcome	Team
Välk	Välk is an autonomous wagon that charges electric vehicles no matter where they are parked. It delivers within a 100 km range in 25 to 30 minutes by utilising an optimised dc-dc power control and delivery mechanism. Välk can be employed at will via the power application on your mobile device, allowing you to sit back and let the wagon come to you.	A mechanical engineer, an engineer of communication electronics and a product designer
VeleV	The emerging variety of Light Electric Vehicles is changing the way we move in cities and this is opening up new horizons for users and service providers. VeleV is a new type of infrastructure to free us from rigid and expensive transportation systems by providing outdoor electricity for people, robots and drones.	A mechanical engineer, an entrepreneur and a designer of technical apparel
Alive	Alive is a new type of station focusing on community and the people living in the neighbourhood, considering their activities and their interests. The station acts as a meeting point for the public, offering flexible space for activities all year long. The architectural look blends into the cityscape of the community where it is located. The materials, colours and soft lines are inviting for all people, not just for car drivers.	A mechanical engineer, an engineer of communication electronics and an architect

Table 1. The comparison of project outcomes and teams. (D&TF 2018)

Team Alive noticed that all the stations are built according to the needs of car owners and the architecture of these are attractive only on the side facing the motorway. The other sides of the buildings are dark and deterring. As these stations are placed in the cityscape, these should take into account the interest of other user groups and the community around the stations. This line of thought is supported by the economic trend of Estonian petrol stations – the margins of coffee and snacks are much higher than petrol, and other user groups and local communities are becoming more critical customer segments for petrol stations than ever before. This insight gave the first perspective for the team: to change the user groups in focus and make the stations attractive for local communities and passers-by (Olivares, O., Shvets, V. and Göktürk, V. 2018).



Figure 2. Team VeleV's station in making. Photo: Evert Palmets

VeleV's team started with analysing prominent macro trends: urbanisation, electrification and how these are affecting our everyday lifestyle towards being more sustainable and sportive. In addition, the team conducted a series of observations in public spaces, petrol stations and near public and private transportation routes in the city. The ambition was to see how people behave in the context of energy and what are the key issues they are dealing with daily. The observations showed several limitations people are facing to overcome the overall change in energy from petrol to electricity and to live healthy lives sustainably. These limitations directed the team to focus on encouraging resilient lifestyles, and they were looking at how to support light electric vehicles as alternatives for private cars and public transport in the cityscape without access to electricity (Lezdina, A., Pärtel, G. and Rosenblatt, M. 2018).

Initially, team Välk's research spanned several segments including energy mobility in the transportation sector to energy requirements in homes and in public spaces to spontaneous energy availability. Their first central perspective was the rigid nature of the energy access points in the city. As the team reported, the filling stations act as access points for people's energy needs, but their rigid nature means that people need to travel to these specific points rather than the energy being transported to them conveniently per the user's needs. Adding this to the need to reduce petrol-dependent transportation, the team continued to analyse the possibilities of how to make electricity conveniently accessible to electric car users (Khan, A., Peever, A. and Vega Anza, S. 2018).

The first research phase directed the teams to quite different routes to follow in the next, concept development phase. The research was concluded with three different aims for changing the business:

- 1) Alive focused on changing the meaning of a petrol station;
- 2) VeleV wanted to support the changing urban lifestyles;
- 3) Välk was looking for solutions to shift to new energy sources.

Hybrid knowledge creation

This described transdisciplinary design process showed how the team members were learning from each other and Alexela's feedback, how the discussions and visualised materials (both research materials and ideations) developed the understanding of possible design interventions and later propelled the ideas and concepts forward. As Karlsson and Redström (2015) brought out in their case study, these teams similarly were not just working in collaboration, but rather designed together by combining different views and possibilities to tackle the energy challenge. The teams entered together into the unknown process where they explored the area in question and the possibilities for future development together. All in all, it can be described as hybrid knowledge creation.

Several shared aims of transdisciplinarity can be identified in these described cases. According to Darbellay, there are two dominant orientations to transdisciplinarity. The first strand, which has an epistemological and theoretical accent, defines transdisciplinarity as "a process of knowing that transcends disciplinary boundaries, and entails a major reconfiguring of disciplinary divisions within a systemic, global and integrated perspective". In the case of Alexela's energy challenge, the process involved team members with different disciplinary backgrounds and the project diffused the disciplinary boundaries. The questions at hand were discussed from different disciplinary perspectives, but also from new perspectives which indicates the hybrid knowledge produced in the process. The second orientation in transdisciplinarity is more pragmatic, participative and applied, and focusses more on a 'problem-solving' perspective by bringing in "political, social and economic actors, as well as ordinary citizens, into the research process itself". D&TF project "Powering tomorrow" was built on the working together of team members, Alexela representatives and a wider audience. The process included user research and collaboration with experts of the field.

Most importantly, the Alexela case shows the strength of the teams as they were working together to construct new knowledge and solutions to problems that "fall outside disciplinary boundaries". The teams explored complex relations, which are woven in a dialogue between different disciplinary cultures: engineering, design and entrepreneurship. In the Alexela case, the reconfiguration and transcending of disciplinary divisions happens in and through the dialogue between scientific cultures and the resolution of societal problems, which according to Darbelly (2014) are the essential specifics of transdisciplinarity.

McGregor (2014) highlights the importance of the conceptual shift which comes along with "moving between, across, and beyond one state to a new state". The conceptual shifts were present in all three teamwork processes. It mostly emerged when applying the new perspectives to the energy challenge. They looked at the petrol station simultaneously as an energy access point, as a local community centre and as an indicator of the ending era of petrol-fuelled cars. These shiftings of view were problematic for those new to the D&TF program, and still difficult to master for the second year students. However, this can be seen as a central feature of transdisciplinary design intended to produce hybrid knowledge.

The primary goals of using transdisciplinarity, according to Klein (2014), are the following main shifts: 1) from epistemology to problem-solving, 2) from the pre-given to the emergent, and 3) from universality to hybridity and contextuality. These three shifts are the foundation of the transdisciplinary approach practised in D&TF projects and are well illustrated in this case study. At the same time, all of these three are moving the practice further from the traditional design practices, which involve pre-given contexts and operate from a single disciplinary perspective.

Estonian design's professional crisis or a new horizon?

Understanding these shifts brings the discussion back to "the professional crisis" described above, where the traditional designers are losing their ground as new design professionals differ from themselves in a significant and key way. The case study shows that Estonian design's "scope of concern" has been widened, and tackling a complex energy challenge is affecting directly and indirectly people's lives and the planet's ecological situation. Therefore, it is important in design process to combine technical innovation with changing people's behaviour. This case study showed one way it is possible – by combining the knowledge and skills of different disciplines. Instead of seeing the situation as a professional crisis, we should look at the overall rapidly changing context and the need to tackle complex challenges as a new opportunity for the design discipline. Professional silos and lack of collaboration are widely discussed as restraints to successfully tackle contemporary issues (Klein 2014), and this supporting the need for new ways of working in the Estonian design scene. This case also highlights the changed role of the designer from the star author to a team player and in this case also to the methodological leader of the process. The role of the designer varies in teams, according to the chosen approach and according to the designer's previous experience and background. This means that the designers have the potential to add a new core competency to their professional toolkit, according to their capabilities and interests and taking into account different changing perspectives, including cultural, technological, and economic forces (Lawson and Dorst 2009; Bremner and Rodgers 2013). But we can also see here the great opportunities for the wider Estonian design scene.

Conclusions

This case study shows that the collaboration of experts from different backgrounds gives new innovative impulses to the design discipline and has created new hybrid knowledge forms, which can be seen as a way to increase overall resilience. In this article, for the first time, the new hybrid identities and professional practices emerging in Estonia are described. The study of three

different transdisciplinary teams shows interesting dynamics as they uniquely merged their capabilities, team by team. At the same time, the case highlights the characteristics of transdisciplinarity practices in Estonia and shows the need to recognise transdisciplinary design as a new form of research and practice. The study illustrates how transdisciplinary research represents a new style of thought in design. The description of the new emerging practice is described and discussed to give a better understanding of the changing boundaries of the design discipline in Estonia. As the paper highlighted, the changes and dynamics in the design field call for further investigations and a rethinking of disciplinary identities.

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A Response to the Challenge of Internationalisation of Design Teaching: Hybrid Learning Spaces

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Abstract

In the context of undergraduate and postgraduate design courses at Coventry University (CU), this paper discusses a nascent pedagogical delivery initiative that is currently the subject of ongoing research, development and implementation - the Hybrid Learning Space (HLS) project. The HLS delivery paradigm originated in response to two fundamental shifts in the tertiary landscape in recent years; the need to meet the challenges of growth in absolute student numbers, and the growing emphasis on international recruitment and the development of internationalized curricula. There are particular pedagogical challenges inherent in teaching international intakes of design students. Such culturally diverse cohorts can often reveal complexities and behavioural modes of learning and participation that are markedly distinct from those of domestically-recruited students. Against this backdrop, there is a need to radically rethink traditional and current pedagogical paradigms for design courses. Fundamental questions need to be asked that challenge entrenched notions of what constitutes a learning space. Most specifically, the future role for the traditional design studio – and its alternatives – in internationalized design course delivery frameworks requires a reevaluation. The imperative is to design coherent mechanisms of design course delivery that can meet these challenges without compromising the academic integrity and quality of the student learning experience. The author's research reveals that some physical learning space configurations can have a negative effect upon student engagement and participation. This may seriously harm their academic performance and attainment. A pedagogic strategy for addressing these issues is at the heart of the HLS paradigm. Methodologically, the paper discusses initial and on-going case studies to illustrate the HLS model in action involving design students in cross-disciplinary and transcultural collaboration. It draws upon active research initiatives, interventions and delivery practices from a number of institutions, including Communication University of Zhejiang (CUZ and Tongji University (TU) in China. A central research objective is to explore the effects of learning space topologies on design student participation and to also propose

an alternative notion of the design studio that overcomes the innate occupancy limitations of physical studio spaces. The paper concludes by summarizing the potential pedagogical and institutional benefits of the HLS framework while pointing the way forward to its ongoing evolutionary development.

Author keywords

Hybrid Learning System; Internationalisation; internationalized curriculum; design pedagogy; student participation

Introduction – Background Context

Over the last twenty-five years or so, the delivery of higher education in Western universities has undergone something of a revolution. A combination of external forces, including – among others - fundamental shifts in funding mechanisms, and a declining university-age demographic, has forced universities to adapt both radically and rapidly. Facing these compound challenges, many universities have devised long-term survival strategies based on combinations of regional expansion, international engagement, and highly ambitious targets for recruitment growth. Since the Western undergraduate recruitment pool has been shrinking for some years now (Griffith, 2017), the requirement to maintain or grow student numbers has necessitated a focus on international markets. Beyond the imperatives of survival and prosperity, there is the hope that this will also lead to a raised international profile and an associated increase in national and international influence. Such influence is a powerful attractant in a world in which teaching innovation, research, and collaborative endeavours are now seen as necessarily internationalized in scope. The recognition among universities that stasis is not an option has triggered a global institutional initiative that focuses on Internationalisation as the only way forward:

A 2016 report by the British Council on national policies for international engagement in higher education found that the number of countries committed to Internationalisation in HE is increasing; 23 of 26 countries studied, for example, now have effective policies to encourage student mobility. The countries rated as most open (policies favouring exchange and Internationalisation) were Australia, Germany, the UK, Malaysia, Germany, and China. (Griffith, 2017, p. 6)

Well-designed and effective internationalized offerings confer genuine advantages and benefits on participating students. These advantages can themselves serve as endorsements of reputational credibility at recruitment time for both domestic and internationally-recruited applicants.

International classrooms lead to improved learning outcomes, foster intercultural skills and create international networks preparing both international and domestic students for living and working in a globalised world.' (Reinold, 2018)

Courses that are likely to prosper are those that can clearly demonstrate that a key component of their strength is their internationalized complexion and the advantages it brings. For it to be successful requires a sustained commitment to the principles of a genuinely internationalized learning experience. This is no quick fix. However, the long-term investment in refining and delivering a high-quality learning experience has the potential to pay dividends when students themselves come to see this as providing them with an advantage when they start to seek employment post-graduation. As one former Coventry University (CU) product design student commented having returned from a 10-week study trip to China that was instrumental in informing his opinion of an internationalized learning experience:

Even though the language barrier may have been a slight issue, we managed to communicate professionally through our designs with the help of translators and students who were willing to help us with any issue we had... The international experience has given me insight into different working methods and in addition I have developed new skills within the design process, it has given me the confidence to make decisions which could impact on the design outcome. (Hilton, 2015)

This student cited his China study trip experience as key factor that favorably impressed at interview and which led to his subsequent employment as a product designer for a London agency that collaborates internationally, especially in China, Japan and Eastern Europe.

Where courses seek to build and develop a deserved reputation for excellence and credibility then the potential to create a self-reinforcing virtuous feedback mechanism emerges. Good reputations cement credibility and the potential to influence and attract strong applicants. Strong applicants, feeling part of a continuum, build on the achievements of their predecessors and raise the bar higher. This enhances the course reputation and its international visibility, which in turn increases the attractiveness of the course...etc. While the mechanism is simple to explain, for this strategy to work, *everything* is reliant on creating a high-quality, positive student experience, especially where classroom occupancy rates are at maximum capacity. In the context of this paper, the focus of what follows is an examination of how product design students directly perceive and engage with their internationalized learning experience and the consequences for outcomes, attainment and progression. Understanding how student performance and pressures of increased student numbers can influence learning space dynamics and student participation is the subject of the following section, which also explores the factors that contribute to student participatory reticence.

Case Study: Participation, Design Pedagogy, Internationalisation

This case study discussion explores how students' participation, learning journey and academic progression are affected by prior cultural conditioning (Hall, 1989) and their learning space environment. It examines how modifications to physical

learning spaces and to the student-teacher power-distance relationship can lead to reduced performance anxiety and enhanced learner participation.

Teachers encourage students to participate in discussions because it is seen as a necessary part of their academic, vocational, creative and intellectual development as they move towards readiness for the world of professional employment. “Participation is a way to bring ‘students actively into the educational process’ and to assist in ‘enhancing our teaching and bringing life to the classroom” (Cohen, 1991, p. 699, cited in Rocca, 2010, p.188). Yet the reality is that students are often reluctant to participate (Gieve & Clark 2005; Radclyffe-Thomas, 2009; Hilton, 2016, 2018).

There are various reasons, both speculative and empirically supported, that students fail to participate in class. One reason is class size, with students being more willing to participate... less anxious about participating... and less likely to be able to “hide” ...in smaller classes than larger classes; large class size tends to hamper communication... (Rocca, 2010, p.189).

Rocca’s multidisciplinary literature review of writings on student participation in the college classroom provides valuable insights in its analyses of student participation. Perhaps tellingly, the very first factor that is cited as a deterrent to student participation is large class sizes. Large class sizes are problematic where the aim is to encourage participation, not least because it amplifies inherent social anxieties among students. (Hilton, 2016, pp. 135-143, Armstrong & Boud, 1983.) This is especially true of those from Asian cultures (Cheng & Guan, 2012; Sit, 2013) - who are extremely sensitive to the risk of losing face in front of peers in circumstances that Kao & Gansneder describe as a ‘negative classroom climate’ (Kao & Gansneder, 1995, p. 136). Beyond any anxieties about risking loss of face, some international students are also reluctant to speak in class because of underlying limitations in their mastery of English. The Author’s own research observations (Hilton 2018) support these positions, as evidenced by CU Chinese design students’ verbatim interview responses to the question of why Chinese students tend to be reluctant to participate:

Sometimes I want to ask question and I think I will try but then I don’t have courage.

When we hear word we don’t understand is difficult. We don’t like to ask question if we don’t understand so is why we don’t speak in class.

Sometimes I can’t totally express my thinking in English.

I think aspect of the most difficult to understand is the problems discussed in the classroom, i need time to understand the different thinking from the different country.

(Anon. verbatim student survey responses, Author’s research data, 2015-2018)

While these are all relevant and legitimate factors that can induce reticence in students, it is worth remembering that students are not homogenous entities, even if they are culturally related; above all, they are primarily individuals. To attribute participatory reticence entirely to culturally-stereotypical factors alone risks overlooking influences that might well be more prosaic in origin. For instance, participatory reticence might well be down to individual personality traits such as an innate shyness:

Even in China people say I am quiet and don't speak much

Learning Space Topologies

Compounding these factors is a further key ingredient that can exercise a powerful influence on students' willingness or reluctance to participate within learning spaces – it's configuration and layout (topology). The anonymous survey responses cited here reinforce consistently-observed learning space behaviour, especially that which takes place within what might be called orthodox classroom or lecture theatre topologies. Empirical evidence, gained from direct observation of student engagement in interventions designed to test the effect of learning space topologies on student participation, has revealed that students (both domestic and international) are generally reticent in their participation in learning spaces that closely resemble traditional classroom, seminar or lecture theatre layouts in which they have little control over the organization of the space or its dynamics (Hilton, 2018). This observation is supported in the literature (McCroskey & McVetta, 1978; Kao & Gansneder, 1995).

Conversely, where learning spaces topologies are less formal and unstructured it has been observed that there is a demonstrable increase in student participation, extroversion and unselfconscious engagement (Figure 1) (Hilton 2018). In broad principle, participation appears to increase when learning spaces become less formal, and even more so when students themselves have some control over learning space arrangements. This finding has been directly observed in the implementation of research interventions conducted by the Author among design students at Coventry University, UK; and at Tongji University (TU) and Communication University Zhejiang (CUZ), China (Figure 2). In all instances, there was a reliably-consistent pattern of positive behavioral response when students were permitted to engage in interventions that were designed to disrupt their conditioned roles as passive students within a learning space that normally has the effect of reinforcing that passivity.

...where teaching space topologies, learning tasks and student-teacher dynamics are modified to permit students to democratically move, discuss, engage and interact within the space and with each other, then the likelihood is that students will feel less intimidated and more likely to actively participate. (Hilton, 2018)

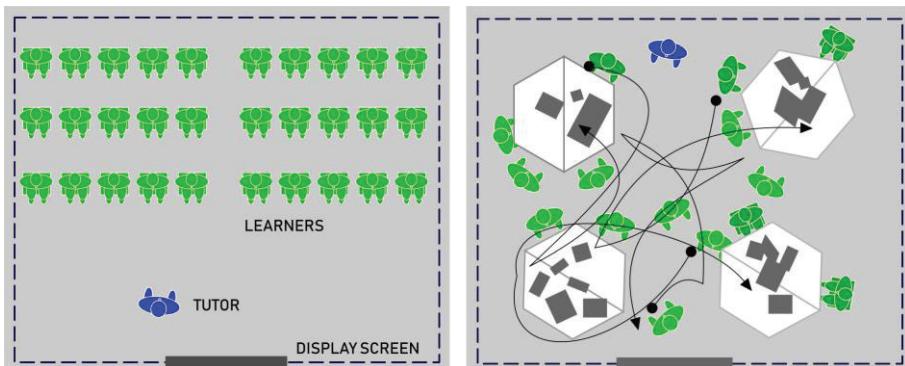


Figure 1: Contrasting classroom topologies. Typical classroom topology on left has been observed to militate against student participation (McCroskey & McVetta, 1978). Amorphous topology on right encourages democratic use of space, movement, spontaneous interaction and participation while diminishing student-teacher power distance relationships. (Author, 2018)

To a degree these findings confirms McCroskey & McVetta's observations on the influence of seating arrangements on student participation and their argument that traditional serried rank layouts were less conducive to participation than other arrangements, such as U-shaped configurations (McCroskey & McVetta, 1978). In conventional classroom topologies, knowledge is perceived to flow from the teacher to the student. A characteristic of the conventional classroom typology (Figure 1, left-hand image) is that it reinforces this perceived direction of knowledge flow and amplifies the power-distance dynamic between the teacher and the student. In this environment, the teacher is perceived to be commanding the space, controlling all that happens within it. Students are subservient in these spaces, not least because they are seated (and therefore, literally lower in status), are largely immobile and have only very limited scope for interaction with each other. For Chinese students especially, this formal classroom topology exerts a conditioned, deep-seated, constraint on student participation and engagement (Cheng & Guan, 2012; Sit, 2013) that has been consistently reinforced right from their earliest days at school:

In China students are taught from early age not to question teacher but sit still, be quiet and listen. Teacher tell us what to do. Some friendly teacher we can ask questions but mostly not question teacher.

(Author's research data, 2015-2018)

Contrast this with the highly informal, amorphous typology in the right-hand image in Figure 1. In this setting, the teacher's role is more of a facilitator and observer who is there to encourage participation by providing an environment in which students have a high degree of autonomy, intimacy and reduced social anxieties. The premise that disruptive learning space topologies can encourage student participation has been the subject of intervention testing at CU, UK and TU and CUZ in China. The intervention, in brief, was that a prior instruction was issued to students to bring along a selection of domestic waste to the session.

The students were not told what for. At the start of the session, students were arbitrarily assigned to small groups and issued with the instruction that they had one hour in which to design a fighting robot. They were then left to get on with it and present their designs at the end of the session. Spontaneously, the students organized their creative working space by clustering their materials and construction activities in close alignment with the amorphous layout in Figure 1. This intervention (and variants of it) have been clearly demonstrated to be extremely successful in stimulating students to uninhibitedly engage without anxiety (Figure 2) (Hilton, 2018). A short video of the TU activity can be viewed here: <https://youtu.be/LbT67YKkEHI>



Figure 2: An intervention designed to stimulate unselfconscious participation and reduce learning space anxieties by allowing students to work within amorphous learning environments in which they take control of the organization of the space and its topology. The left-hand image is at CU, while the right-hand image is at TU. The intervention has also been tested at CUZ. Student behavior in all instances was similarly extrovert even among naturally shy students. (Author, 2018)

This observed increased participatory willingness among international product design student supports Radclyffe-Thomas's observations of Chinese fashion design students (Radclyffe-Thomas, 2009) in similar circumstances. In her study, generally-passive students were encouraged to become more actively engaged through modifications to the learning space dynamic and the student-teacher power-distance relationship. Reflections on the implementation and outcome of the interventions has led to the following postulates, visually summarized as a schematic in Figure 3:

- Students of all nationalities, including home students, can be reluctant to participate in situations in which they feel socially exposed or under pressure in front of their peers. Some learning space topologies exacerbate this reticence. Large class sizes make the situation worse (Cohen, 1991, p.699, Rocca, 2010, p.191).
- For cultural and social reasons, some international students (especially Chinese students) are chronically conditioned to adopt introverted behaviours that actively disincline them to participate within formal learning spaces. (Hall, 1989; Cheng & Guan, 2012; Sit, 2013, Hilton 2015, 2018, Hofstede, 2010, p.118)
- While international students possess certified levels of English language competency, many of them find the realities of understanding natively spoken English and the specialist language of design discourse to be challenging to the point of incomprehension (Gieve & Clark, 2005);

Hilton, 2018). Rather than expose their limitations and risk loss of face, affected students adopt introverted behaviours and are extremely reluctant to participate. (Chan & Rao, 2009; Hofstede, 2010, p.118, Rocca, 2010, p.191)

- Where international students don't or can't participate in discussion because of anxieties, they can't improve their English, thus reinforcing a negative feedback loop. No improvement -> performance anxieties -> participatory reticence -> no improvement -> performance anxieties...etc.
- Some formal learning space layouts (topologies) can exacerbate these issues, especially orthodox classroom layouts that tend to reinforce teacher/student power/distance hierarchies and amplify anxieties (Figure 3).
- Informal learning space topologies that disrupt orthodox layouts have been shown to favorably encourage unselfconscious student participation. Informal spaces and small student groupings have been found to be the least threatening learning environments for students. (Hilton, 2018).
- With increased participation comes enhanced cross-cultural engagement. Growth in confidence leads to improvement in language proficiency and learning progression. Learning progression reinforces confidence, increases participation, improves language, improves progression...A positive feedback loop is created. (Figure 3)

Through pedagogical observation and the testing of interventions in the UK and in China, a complex inter-relationship has been identified that has been shown to affect design student participation and learning progression (Figure 3). These findings are supported in the comprehensive survey of discipline-agnostic writings summarized by Rocca's literature review (Rocca, 2010) and the design-specific writings of others (Radclyffe-Thomas, 2009). The salient question is how can this finding be used to mitigate the problem of delivering a high-quality design education in the face of growing class sizes and culturally diverse cohorts? The following section delivers a case study that explores how the notional concept of what constitutes a learning space was challenged by students themselves choosing to conduct their learning experiences within an online, as well as a physical, realm.

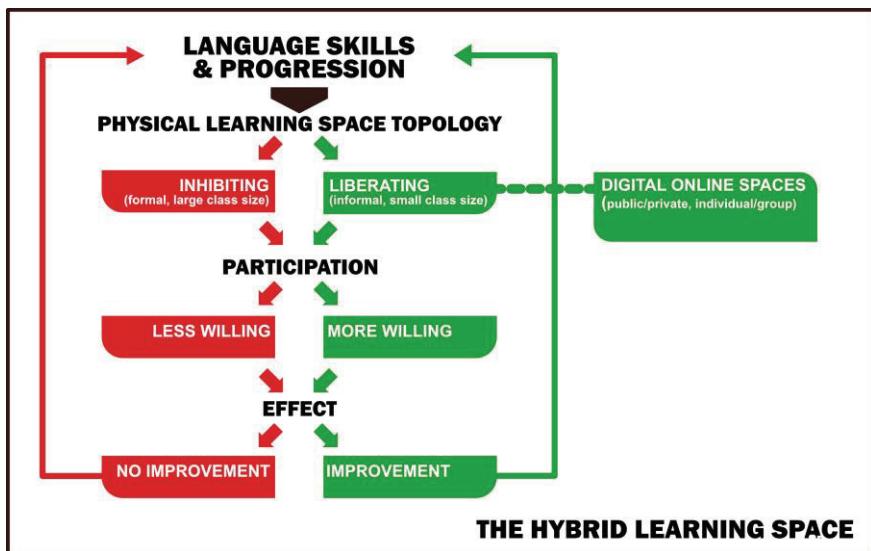


Figure 3: A schematic relationship that illustrates the interconnected factors that affect student learning, language skills and progression. The relationship is complex and dynamically interdependent. Negative feedback loops (shown in red) show how some combinations of factors negatively reinforce each other to harm student attainment and progression. The optimal Hybrid Learning Space is created when circumstances favourably combine students' own control of learning spaces to encourage participation. (Author, 2018)

Case Study 2

COIL, Hybrid Learning Spaces and Student Participation

This case study explores how a hybrid learning space (HSL) environment emerged organically by the direct actions of students themselves who were tasked with engaging in an internationalized online design project. By independently electing to conduct their collaborations largely within a familiar and non-threatening online space, students demonstrated that they in situations where they have direct control over their environment, cross-cultural participation increases and performance anxieties diminish.

Coventry University actively fosters collaboration with international institutions. In that context, Course Directors are encouraged to organize short-term projects which are conducted entirely online with matched overseas partners. These projects – Collaborative Online International Learning (COIL) are typically one or two weeks in duration. In January 2018 a COIL project was arranged with an undergraduate Product Design course at Communication University Zhejiang (CUZ), in Tongxiang, China. The 20 participating design students at CU comprised both undergraduate and postgraduate from the disciplines of product design, interior design and design & transport and originated from seven nationalities, including UK students and three Chinese students. The students

were split into 5 groups of 4 and these were paired with groupings of the students at CUZ coordinated by the supervisory Chinese and UK academics in advance of the start of the project. The brief required that each group should design a trophy as an award for graduating students at each institution. So students at CUZ would design a trophy for graduating students at CU and vice versa. A key learning objective of the brief was that the students had to demonstrate that they had arrived at their design proposals only after they had undergone a process of gaining empathetic insights into the ethos and cultural values (both institutional and national) of the students they were designing for. It was emphasized that the design outcomes should embody these values and that the only way that they could gain the necessary cultural insights was to actively engage with their partner students.

Two communication tools were chosen to coordinate the project and facilitate the presentations of the students design proposals. Teamviewer - in essence a remote technical support tool that is also capable of multi-user online video conferencing and file sharing, was chosen for a variety of reasons, not least, its acceptance as a permissible application inside China (Teamviewer, 2019). Beyond that, it is easy to set up and participants can access online meetings entirely within a browser without having the need to install software on attendees' machines. WeChat – a Chinese version of WhatsApp - is ubiquitous in China. (Indeed, WeChat is so tightly integrated into normal daily life, social, payment and transport systems in China that as a native it is very difficult to function without it.) It allows users to communicate via text, live video and audio calls. It can also be used to asynchronously exchange images, short video clips and audio messages (WeChat, 2019). In preparation for the first live meeting, all students installed WeChat and instruction in its use was given for those that needed it. The very first live meeting focused on introducing the student to each other and going through the brief. Even as the tutors were explaining the project programme, students from both institutions began immediately contacting each other via WeChat, sending pictures and video clips of each other. What was remarkable was the spontaneity and unselfconsciousness with which the students interacted with each other (Figure 4).

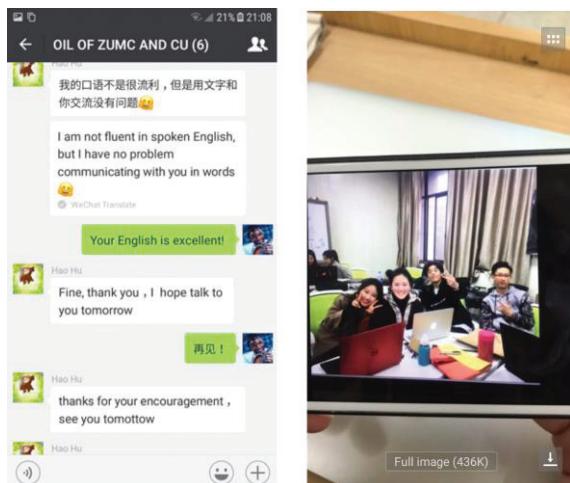


Figure 4: Screen grabs of WeChat discussion showing communication between CUZ tutor and CU tutor (left-hand image), while students (right-hand image) video-streamed themselves from their studio, while simultaneously using WeChat to exchange messages with their UK counterparts. Note the in-built WeChat Chinese-English translation feature in the left-hand screen grab. (Author, 2018)

What was apparent was the evident playfulness and complete lack of any intimidation or reticence (Figure 4). The CUZ Chinese students were the initiators and clearly were completely at ease in this means of communication with people, who only moments prior, had been complete strangers to them. Certainly, they were at home within the physical space of their own studio, while the norms of socializing within WeChat was very much second nature to them. By the end of the first one-hour meeting, each group had got to know each other and had exchanged contact details and agreed a strategy by which they'd continue to communicate and collaborate on exchanging information, advice and research material. Most tellingly, all this had happened with no guidance or direction from the project tutors. It would seem that the students did not feel as though they needed to behave as passively under these novel circumstances as they would under typical classroom conditions. Importantly, they did not seek or require prescriptive guidance from tutors.

Over the duration of the project, the students worked largely independently and organized their programme of work and the exchange of information both synchronously and asynchronously via WeChat. Tellingly, while students were free to use their own studio spaces during the project, very often they'd choose to collaborate and coordinate elsewhere – and not just in formal learning spaces within the University. For instance, some students would convene meetings in highly informal spaces, such as their accommodation or in coffee shops and connect to their CUZ counterparts via WeChat's inbuilt video chat feature. During these sessions, images and other digital assets would be exchanged and questions answered. On occasions, students would similarly use WeChat to discuss matters with tutors or request ad hoc feedback on work in progress without inhibition or having to formally arrange tutorial slots. In essence, the students themselves were effectively deriving a new notional construct of what

constitutes a learning space. Under their paradigm, a learning space can be almost anywhere and boundaries between the physical and the digital is highly plastic. The physical and the digital, the synchronous and the asynchronous, the present and the distantly-connected – were all as one, being appropriated as strategically necessary. This new notion of what a learning space can be is a conceptual amalgam – the hybrid learning space (HLS). This freedom to connect and communicate within physical and digital realms seemed to do more than serve as an effective means of exchanging information, testing ideas and sharing experiences. It also seemed to help strengthen the collaborative bonds of their shared endeavour. Perhaps most importantly, the students themselves were in direct control of it. The presentation of the design proposals on the final day saw each group present their work via Teamviewer as a video stream of them delivering their presentation (Figure 5). Again, there was no evidence of performance anxiety or participatory reticence.

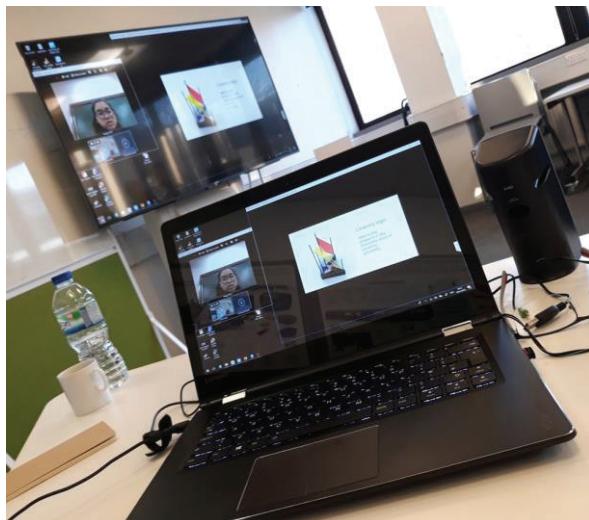


Figure 5: Live presentation of final design proposal with video stream of presenters and on-screen display of design work.

Development of the HLS Paradigm

The COIL project was deemed to be a considerable success by all parties. Tutors and students alike were extremely positive about the project outcomes. Even the UK students were enthusiastic about this new way of working – ‘we’ve never done anything like this before’. Some commented that it was easier working online with the Chinese CUZ students in this way – ‘we became friends really quickly’ – than it was physically working in the studio with the visiting Chinese students on the same course. Yet the project had only involved 20 students from each institution. The question was, could the HLS paradigm be extended to learning situations in which the class sizes were very much higher?

Figure 6 shows a subsequent project session (February 2019) in which approximately 60 students from graphic design and product design courses at

CU have just been introduced to each for the first time as part of a cross-disciplinary collaborative project. After an initial introduction and briefing, the students were left to get on with it. With students in close contact around circular tables, it was only a matter of moments before they all began talking and introducing themselves to each other, oblivious to the presence of tutors. Here too, the students were encouraged to use WeChat (or preferred alternatives) as a means by which communication could continue after the initial hour-long meeting had finished. At the time of writing, this project is on-going, but what has already emerged is that students are choosing to work, communicate and collaborate along very similar lines to those involved in the COIL project. They too are using informal spaces as learning and collaboration environments. They too are using social media to bond. And they too are deriving their own ways of sharing resources and offering feedback and critique on each other's work by shifting between physical and digital realms and exchanging assets digitally. Periodically, there are face-face tutorials with tutors, as well as in-class teaching sessions and reviews of the design outcomes. The studio and classroom spaces tend to be used mainly when it is necessary to produce physical design artefacts such as prototypes and models. Students are reporting that they are enjoying this way of working and the increased autonomy it gives them. Tutors are reporting a noticeable increase in participation and engagement, and the observation that much productive work seems to be happening 'behind the scenes'.



Figure 6: Contingently-amorphous classroom topology in a highly-congested learning space. There are nearly 60 students in this space. (Author, 2019)

Conclusion

The hybrid learning space paradigm is still very much an ongoing experiment. The raw basis of the model is that physical spaces are used contingently, and when they are in use, their topology, where possible, is strategically reconfigured to encourage greater student participation and engagement than is often the case within conventional learning space topologies. This, combined

with the use of online digital technology, familiar social media tools and communication technologies which students use according to their own needs and strategic demands, can increase cross-cultural and individual participation by reducing performance anxieties and by diminishing perceived student-teacher power-distance intimidation. With a reordering of classroom topologies, the perceived role of the teacher changes from authority figure to facilitator and guide and students gathered in small clusters feel more socially at ease. In execution, tutors manage space contingently by only gathering large cohorts together where necessary or because the space has a particular, specialist purpose that can't be met elsewhere. When acting independently, students often choose to collaborate within informal spaces. Beyond that, students collaborate in non-threatening and familiar online environments that fulfil the role of a conceptual learning and collaboration space.

Looking ahead, it is possible that existing informal and public spaces, such as canteens, auditoria and recreational areas could be institutionally-considered to be valid learning spaces in which students could choose to work as needed. By allowing large cohorts the potential to break-out into smaller, self-organised groupings, any social anxieties have been shown to be significantly diminished. Administratively, the pragmatics of obligations as they affect Tier 4 students mean they must still attend timetabled sessions, and it is not yet realistic at CU to replace this by allowing students to absent themselves to work independently elsewhere. Yet an overall ambition to give students more control of their actions, by assuming a greater responsibility for their own learning processes (and their personal development) and by increasing their willingness to participate, brings with it better chances for international students to accelerate their cultural assimilation, strengthen their language skills, improve their progression, and attain higher academic outcomes. And by extending the conceptual schema of what defines a learning space, the scope for imaginative deployment of hybrid learning spaces becomes more exciting.

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Professional Papers

New Models for Research and Shared Experience in the Ceramics Classroom/ Studio

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Abstract

How do art and design educators innovate while still being responsible to the training of its techniques and skills? These issues are especially poignant in the field of ceramics, an area long in tradition and history, but also one that is inherently cross - disciplinary. In an attempt to create new ways of thinking about how an art institution can function, ceramics faculty at the Maryland Institute College of Art (MICA) have created and developed new initiatives in the ceramics program using collaboration in pedagogy, and residency models, as a way of bringing working artists and students into the studio in new ways. By hosting a group of working artists in ceramics to work collaboratively, the classroom is transformed into a "think tank", providing a platform for the generation of innovative ideas and art works in these cases exploring technological issues at the intersection of ceramics and new digital fabrication technologies. Growing out of these residency experiences, faculty have sought new ways in which this approach might be furthered within the structure of the classroom and curriculum itself. The residencies have resulted in additional symposia and curricular development, community relationships, inter and extra institutional relationships and professional experiences for students, and in regards to the CUMULUS ROVANIEMI themes, has explored the ceramic medium's potential to create new cross-disciplinary paths for art, design and media.

Author keywords

Craft; Art-education; Innovation; Collaboration; Technology

Introduction

There is something unique that happens when artists come together with open time and the facility and support to pursue new ideas. The time of making, thinking and struggling with new ideas creates a kind of open ended plastic space in which often the best work can occur. As art educators, specifically ones that are focused on the process intensive, historically dense medium of ceramics, how do faculty create these kinds of opportunities within the classroom and within our academic institutions?

Reframing Educational Structures through the Residency Lens

Structures within the art educational institution create their own friction with these aspirational goals. In response, one must explore different models and formats for what an art institute can be, honoring the institution's commitment to learning and innovation in the broadest sense while exploring new forms of collaboration, research generation and pedagogical development. In an attempt to create new kinds of learning environments within the art institution, recent initiatives were invented and pursued in the Ceramics department at MICA using collaboration in pedagogy, and residency models, as a way of bringing working artists and students into the studio for new modes and types of learning. More specifically, one short term workshop and two longer residencies were organized at MICA that have broadened the way in which the institution behaves. By hosting a group of working artists to work collaboratively, the classroom and institution is transformed into a "think tank", providing a platform for the generation of innovative ideas and art works. This initiative has also further addressed dynamic new trajectories and questions within craft that have been spawned by the growth and application of new digital fabrication technologies and hybridized approaches to the medium. Historically, "technological development has always been regarded as a threat to the crafts" (Jönsson, 2007, p. 247), but instead we choose to upend these false dichotomies. Exploring technological, conceptual and pedagogical issues at the intersection of ceramics and new digital fabrication technologies, these "think tanks" allowed participants the opportunity to experiment with new methods of making, systems of thinking and to pursue and be engaged in dialogue around the implications of this way of working to their own practice as educators. The residencies were designed to bring together multidisciplinary groups of experts to examine issues and experiment with processes and materials related to ceramic arts, new technologies, craft, design, site-specific artwork and architecture. Focused time working with the institution's diverse array of digital fabrication technologies as well as state of the art kilns, these residencies were devoted to collaborative and individual research in the development of new bodies of innovative artworks, and a discussion of their place in pedagogy and contemporary crafts.

Growing out of these residency experiences, Ceramics faculty at MICA have sought new ways in which this approach might be furthered within the structure of the classroom, and curriculum itself. Some of this work has occurred by strengthening the ceramics departments' connection to other departments in the institution, through connection to projects in the community and exploring collaborative projects; as well as in the development of courses that seek to occupy the model of the collaborative residency more broadly.

Background

Ceramics is an especially dynamic and complicated medium. Long in history and tradition but simultaneously permeable and engaged in activities from science, to art, design and architecture, the medium has unique potential for innovation. With that in mind, ceramics education has unique opportunities to explore but also must be responsible for the training of complicated techniques and tools. These issues become all the more important as ceramics is experiencing an “increasing visibility and popularity” (Archer, 2014, par. 13) and craft recognizes new levels of resilience in practice and theory and practitioners explore its cross disciplinary nature.

One only need to look over the history of institutions of art education to see how changes in world view, shifts in economic realities, changing conceptual foci and changing notions of the role and importance of artists in the world have created sudden changes in our pedagogical and institutional models. That being said, it is notable how long certain historical approaches to a given field, or the nature of art education itself have been maintained. This maintenance existing despite significant changes in the world that surrounds the institutions that faculty inhabit and serve. There are notable examples of innovations on micro and macro levels as educators and artists have sought to rethink what the “classroom” could and should be for. Just as Gropius sought change that responded to that time by extolling us to “embrace architecture, painting and sculpture in one unity” (Gropius, 1919/1978, p.31), we must pursue our own responses to the context in which we find ourselves. Driven by these questions, faculty at MICA’s ceramics department have sought to consider and implement a wide range of responses to the question of what ceramic art education can and should be. Potential directions are necessarily in relationship to the larger institution, external assessment structures and the realities of the financial system that affects our decisions.

A Hybridized Approach; Think Tank Classroom and Residency

In an effort to create a response to these very questions, the Ceramics and New Technology Research Initiative was created, and has now supported and grown multiple offshoots, projects and new possibilities. The goal with these initiatives is to more thoroughly and formally integrate the possibilities of the artist residency (or of cross-institutional collaboration projects) in an academic art environment, as a way of reconsidering the way in which an institution can function, in the creation of broader networks for the institution and department, in delivering more content to students in terms of technique, professional practice, but also collaboration and community in art making, and a focused area of research and development. Integrating the residency “think tank” model into our department has led to growth in the areas of new technologies (in particular, our digital fabrication lab), collaboration between departments, institutions and faculty in terms of technology, shared resources, and an increased engagement with the local community. The specific content and background of these projects include:

Ceramics and New Technology Research Initiative

Ceramics technology is ancient, rooted deep in our material culture. Ceramics is also a cutting-edge technology being used in the development of more efficient filters, space shuttle tiles, medical implants and in other aspects of industrial design. One of the most pressing and relevant developments within

contemporary ceramic art is the increasing access to and adoption of new ways of working that combine the newest technologies with this ancient material, with a focus on collaboration and interdisciplinary practices. Tanya Harrod points to how “the computer revolution increasingly affects the creation and, certainly, the manipulation, storage, and distribution of all media” (Harrod, 2007, p.225) and this includes craft and ceramics as well. These trends are creating new opportunities to bridge and renew the fields of industry, design, science, and art through the ceramic medium. Ceramics as a media is fundamentally interdisciplinary, fitting in the cracks between numerous fields and applications and as such is tremendously relevant to new developments in technology.

In 2008, the Ceramics and New Technology Research Initiative was created at the Maryland Institute College of Art with funding from our Office of Research. This initiative, designed to foster new thinking, partnerships and explore the burgeoning marriage of science, ceramics and studio based artistic practices has supported innovative programming, new partnerships and visiting lecturers and has made the Ceramics Department a hub for new research in this area. The initiative has created, facilitated and supported research, programming and publications, and has supported the development of new curriculum.

Fabricating Ideas Workshop and Symposium (Fall 2009)

The workshop brought a group of six ceramic artists and educators for a short three-day workshop to share their techniques/ creative processes at the intersections of ceramics and new technologies utilizing the facilities available at the college’s digital fabrication center. In addition to the development of a range of pedagogical strategies and ‘tool kits’ to support the education of artists and designers in these new ways of making, the workshop led to a critically acclaimed exhibition that included national and international participants. Student involvement and development through the workshop and symposium included participation as technical assistants as well as the student bodies exposure to several lectures and a panel presentation. This programming also led to a better understanding of the limitations of the digital fabrication facility and spawned the first curriculum at the school focused on ceramics and digital fabrication. From this workshop grew partnerships with other institutions and new opportunities for students.



Figure 1. A selection of 3D printed prototypes for further development in ceramics. Prototypes featured include those of Neil Forrest, Steven Montgomery and Jeanne Quinn

*Creative Residency in Ceramics and New Technologies
(Summer 2012)*

Funded by a National Endowment for the Arts, ArtWorks Grant, the Creative Residency in Ceramics and New Technologies (CRCNT) hosted a group of five nationally and internationally known ceramic artists for a three-week residency at the college in June 2012. The residency was designed as a "think tank" to bring together a multidisciplinary group of experts to examine issues and experiment with processes and materials related to ceramic arts, new technologies, craft, design, and architecture. Specifically focused on questions of social abstraction, focused time working with the college's diverse array of digital fabrication technologies as well as state-of-the-art kilns, this residency was devoted to collaborative and individual research in the development of new bodies of innovative artworks exploring the creative potential of the intersections between ceramics and the new technologies of digital fabrication. Additionally, participants in the residency took part in a weekly series of organized discussions in order to engage with the questions arising for them through these new tools as artists and educators. Student involvement and development through the residency included participation as technical assistants and interns and was cross institutional in its effect.



Figure 2. A CAD/CAM printed prototype in process for further development in ceramics.
Prototypes featured: Neil Forrest

*Creative Residency in Ceramics and New Technologies
Symposium (Fall 2012)*

The symposium featured lectures and panel discussions by the participants of the CRCNT meant to reflect on and share some the experiences and outcomes of their shared residency experience. The symposium sought to extend the think tank experience outward and to bring new information to our college community and the general public. Student involvement through the symposium included participation as technical assistants as well as audience members. Additionally, students had the opportunity to engage in one on one studio visits and discussions with the artists involved.



Figure 3. An artwork by Neil Forrest that sprung from the research conducted in the residency: *Hard Transits*, (detail view), Stoneware, Steel cable, Installation h 79" X w 157.54 X d 157.5", 2013, photo: Øystein Thorvaldsen.

Architectural Terracotta Colab Residency (Summer 2017)

In the summer of 2017, the Ceramics department at MICA hosted a residency centered around the history and art/design potential for architectural terracotta, digital fabrication and collaborative studio models. Funded by a National Endowment for the Arts, ArtWorks Grant, the Architectural Terracotta

CoLab brought four national and international ceramic artists to explore the intersection of historical architectural terracotta in Baltimore with collaborative design practices, innovative tools, and new fabrication techniques. In addition to producing a series of artworks, the artists integrated and shared their work in a series of walking tours with the local historical society, studio visits and workshops. The intention was to develop arts programming for the general public and college community, with the hopes of generating a dynamic exchange between the artists, public and our students. Student involvement and development through the residency included participation as technical assistants and interns and was cross institutional in its effect.

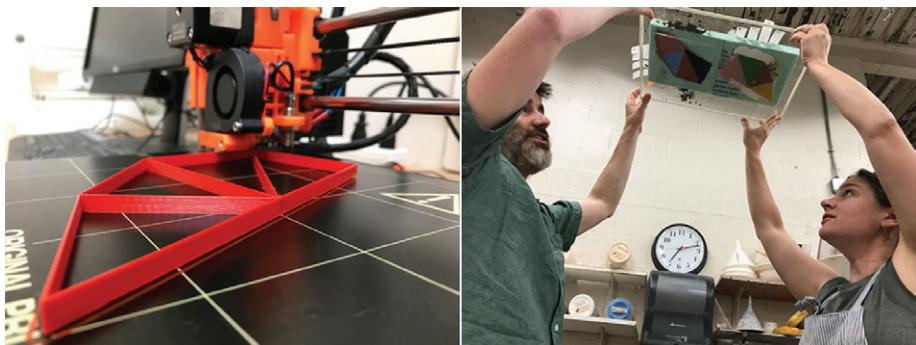


Figure 4 (left). A 3D Printed colored concrete separator prototype for making tiles, Printing with red PETG filament. Approximate dimensions: h .25" X w 15" X d 5", 2016, photo: Kala Stein.

Figure 5 (right). Kala Stein and Seth Payne test the colored concrete separator prototype in the ceramics lab at MICA. photo: Tom Schmidt

Architectural Terracotta Colab Symposium and Exhibition (Winter 2018)

The Terracotta Colab reconvened after the residency and participated in a public symposium held at MICA. The symposium included art historian Ezra Shales, and focused on collaborative work environments, the artworks produced during the residency, and the processes and technologies explored by the artists. An exhibition of the works produced during the residency accompanied the symposium, and an emphasis was made to display finished works alongside tools, tests and examples of process. Students had the opportunity to engage in one on one studio visits and discussions with the artists involved.



Figure 6. Tools and processes from the Terracotta CoLab residency, on display at the National Council on the Education of the Ceramic Arts in 2018. photo: Kala Stein

Conclusion

Curricular Development

The residencies, symposia and accompanying exhibitions have generated opportunities for students to work with artists in a dynamic way. Parallel with the residency series, our department has also developed a number of courses that aim to create similar opportunities for students in the context of the classroom and to develop and enrich course work that melds work in ceramics with the new techniques and ideas associated with digital fabrication. The oldest course generated is called Hybrid Methods. This course aims to foster new ways of working and thinking as students are asked to navigate and respond to prompts the fuse digital fabrication processes to ceramics processes, and to innovate and expand on known methods. Another course that has grown from these initiatives is called CoLab: A Ceramic Think Tank. The course is open to both graduate and undergraduate students, and aims to foster collaboration between these two groups by pairing them together in the resolution of design problems. The course recently hosted a tile-making workshop with children from a local after school art program. Our students were involved in designing, preparing and carrying out the workshop, under the guidance of graduate students, teachers, and our schools office of community engagement. One of the goals in CoLab is to have students applying their problem-solving skills in an art context, outside the culture of the school, by introducing the dynamic variable of a workshop, or collaboration with a grad student- as a catalyst to active thinking and learning.



Figure 7. A selection of large tiles made during a workshop in a class called CoLab. The workshop invited children from a local after school art program to learn about ceramics and decorate a large ceramic tile. These tiles were integrated into a pollinator garden in a local schools playground. Tile dimensions: h 1.5" X w 12" X d 12", 2017. photo: Mat Karas

Outcomes for Participants; Studio Research, Professional and Pedagogical Development

The rigor and notoriety of faculty research is a vital driver within the context of the art institution. As practitioners, faculty engage in the furthering of not just the school's programming but of the field itself. That this project was founded as a research initiative is a purposeful one, encouraging the role and relevance of research. On a practical level, the workshops, residencies and symposia were a professional development opportunity for participants, creating a space for the development of new skills, especially in the area of digital fabrication and ceramics. The residencies also led to the creation of new artworks, and these were exhibited both nationally and internationally. These events also helped create a links between faculty from diverse institutions, have strengthened their practice notoriety and enriched their pedagogy through exchanges in terms of the type of technology used in the department, and in terms of curricular application.

Outcomes for the Institution; Research and Development, Cross Departmental and Cross Institutional Collaboration

The outcome of these projects has extended far beyond the ceramics department. Put simply, these projects have brought in significant external research funding as well as given the institution greater acclaim. The residencies have led to an increased use and further development of the digital fabrication lab at our institution, both in terms of how to teach with the tools, and also in terms the staffing of the area and size and type of equipment available. The corresponding exhibition and symposia have led to increased visibility for the institution both locally, nationally and

internationally. The residencies have also led to a multitude of exchange between departments in terms of pedagogy and technology.

Outcomes for Students; Academic Content, Dynamic Educational Environment

The outcomes for our students broadly start with the professional development and content of the lectures, and is further reinforced by meeting the visiting artists in the context of a studio visit. A smaller number of students benefited from direct interaction with the artists and processes explored, serving as technical assistants and interns for these projects. On another practical note, the developments in digital fabrication have lead to additional course offerings and studio tools. And finally, but perhaps most meaningfully, the residencies have led to collaboration between departments from different institutions that leads to pedagogical exchange. This exchange is a benefit to students in terms of the content they receive, but also by the structure of the culture they are learning from. It is the faculty hope that, by working in a collaborative environment, students will gain the communication skills necessary to make such environments a possibility in the future.

Growing out of these New Models: Potentials not Realized

New educational models have provided student with novel educational experiences that fortify their understanding of the field of ceramic art, design and technology. The residencies have resulted in additional symposia and curricular development, community relationships, inter and extra institutional relationships and professional experiences for students. These programs have created greater resilience for the area, for contemporary ceramics education and in strengthening of field's cross-disciplinary nature.

The space of the classroom is filled with the potential to be a lab of innovation. So too, the art institute can function this way. Through the generation of these initiatives, the department has developed, but the initiative is also meant to question the potential of the host it serves. Art institutes can and should function as a hot house for ideas. The idea behind a "think tank" residency that brings together leaders from potentially a wide array of fields to explore new works becomes the force behind these initiatives, but in their varying byproducts (some realized, some not) lie an open question. With the art institute as host, a new kind of research environment is created and its various by products (professional development, pedagogical, entrepreneurial) all serve to rethink and extend the effects of our commitment to research.

This initiative could then be seen as new model, a new opportunity, one that could be borrowed, shared, exchanged and re imagined for schools to pursue new partnerships and collaboration. For example, perhaps a "think tank" residency, potentially becomes an initiative shared between groups of schools, with different schools acting as hosts and representatives from each institution attending, further deepening our collaboration and also supporting new research and thus more relevant pedagogy for our students.

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5. The Future of Design Teaching I

This theme addresses the future of design teaching by considering how educators can keep up with the challenges posed by present day societies, business and global issues. The objects of design are complex, transient and multidimensional, and thus the design competence taught in higher education is holistic and cross-discipline even more than before. The value of learning through making and the creative relationships between design, art, media and research will be explored with a cross-disciplinary focus on change. Questions related to how design education facilitate these learning processes will be addressed in this theme.

Academic Papers

The empirical bridge: Linking theory and practice through a praxis based approach

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Abstract

This study discusses a learning intervention incorporated into a first year assignment for novice university students studying design. A praxis based approach, in which students had to demonstrate their understanding of theory through creative outputs, was incorporated into the structure of a six week course. Essentially the goal was to embed theory into practice and make student understanding of theories and their relevance to design more explicit. The design output was an ebook which gave students an opportunity to examine theories presented in lectures and 'apply' their understanding through their own creative outputs, supported by academic writing and an audio/visual presentation. It is argued here that an emphasis on a visual and creative approach provides design students with an opportunity to use problem solving to synthesise their understanding of theory in a way that is relevant and meaningful to how they prefer to work.

Author Keywords

Praxis; integration; analogy; ethnography.

Introduction

University design educators have for some time sought to provide students with an appropriate balance of theory and practice in their teaching programs. Many of our current design pedagogical approaches can still be traced back to the pioneering and innovative ideas of the Bauhaus. However, despite the acknowledged significance of the Bauhaus, Strickler suggests it is responsible for a "theory/practice dichotomy" (1999, p. 27). This division, Strickler suggests, is a consequence of the practical, vocational focus of the Bauhaus which was "removed from the traditions of university scholarship with its

concern for veracity and empiricism” (p.28). This approach therefore downplayed the significance of theory and its role in learning to be a designer. She goes on to suggest that, as a consequence of this lack of connection, there is a need for “an empirical bridge between theory and practice (p.38). The notion of a bridge suggests some kind of a gap which needs to be crossed. It also highlights that epistemologically, theory and practice are different and require different modes of thinking and doing; on one hand the pursuit of explicit understanding and deductive methods of working, and on the other hand an approach which uses tacit knowledge and inductive/abductive reasoning (Lawson 2006). From my own experience, twenty years on from Strickler’s call, I have noticed that without careful curriculum design, some design students do think of theory and practice as separate, unconnected entities and frequently fail to see the relevance of theory and how it can enhance their practice. So, how do we construct such a bridge in order to bring about a theory/practice fusion? In this paper I will explore how an explicit praxis based approach can allow students to engage with theory and practice in a meaningful way. The notion of learning through meaningful activity relates to Mayer’s (1996, p.4) position that learners are “sense makers” and that engaged learning will only take place when students see the relevance of the activities they are asked to engage in.

In 2018 a new first year course was added to the Bachelor of Design degree at Griffith University. Titled ‘QCA 1530 Applied Practice’, the course set out to create a synthesis between theory and practice, essentially a blend between being a theory course and a studio course. This paper focuses on the first six weeks of the course which required students to produce an ebook which demonstrated student understanding of the content of five lectures on the following themes: Analogical reasoning (analogy and metaphor), ethnography, narrative. The overarching thread between all of the lectures was design process, semiotics and human-centred design. Various theories were introduced in the lectures and in each weekly studio class the students were asked to explore what they learned by producing designs which encapsulated their understanding of the themes. A ten page double spread book was produced by each student. Each spread contained an image designed by the students accompanied by a short, supportive and evidence based, written component which explained each image and discussed, through citation of literature, the theoretical ideas contained in the lectures. A further evidential basis was provided in a digital audio visual presentation which students had to submit. The tutorials only lasted two hours, so the emphasis was on concepts and not on technical skill. Nevertheless, many of the students worked on their designs after class and produced, for novice first years, good quality outputs. Cumulatively the book demonstrated and described the students’ ideas about what design is. The students’ experience of making the book will be discussed later.

Discussion

The debate as to what constitutes best practice in theory/practice integration is an ongoing one. Pring, as far back as 1971 talked of the importance of integration of theory and practice in learning environments. Rintoul argues that currently the issue is still far from resolved, “The problem of integrating theory and practice emerges from the framing of these two components as binaries with discrete languages and identities” (2014, p. 346). This language

barrier is one which can be thought of as a binary which sees theory as 'head' and practice as 'hand'(ibid). Rintoul also suggests that when critical and contextual study is "embedded in studio practice, knowledge is typically more tacit" (2014. P. 250). This has implications as to how we can help students develop meta-cognitive awareness and explicit understanding of how they are integrating theoretical ideas into their practice, as well as helping them develop explicit understanding of their design process. On the significance of meta cognition to learning, Fluss (2009, p.185), is of the view that "teaching theory is showing students how to be self-conscious about their own thinking", adding further that it requires "approaching theory more inductively than deductively, starting with the problems and examples that are meaningful to the students and bringing in more explicitly theoretical work as needed along the way" (ibid). Schön (1983) tells us that "our knowing is *in our action*" (p. 49) and suggests that we can gain verifiable insight into our thought process. "I shall argue that it is [reflection] susceptible to a kind of rigor that is both like and unlike the rigor of scholarly research and controlled experiment" (p.ix). Cross (2007), pointing out that designing is an applied activity reminds us that "education must be designed deliberately to enhance and to develop students' intrinsic cognitive processes", (p.20). In relation to how this plays out in the design teaching studio, Conole and Willis point out that most design educators' approaches to their teaching is implicit based. However, they argue "A key principle of learning design is to help make the design process more explicit and sharable." (2013, p.1). However, Wrenn and Wrenn, say that students who don't see the relevance of theory and its relation to practice do so as a consequence of "failure of the teacher to integrate both theory and practice into the same course" (2009, p. 258). So, the issue of how theory is integrated into practice becomes important if we are indeed to help develop stronger meta-cognitive awareness and explicit understanding in our students.

The apparent epistemological dichotomy between theory and practice might be better understood if we, for the moment, simplify things down to a very basic proposition that theory requires critical thinking and practice requires creative thinking. Within those limitations we can compare them from a taxonomical perspective. Critical thinking, as defined by Harris (1998) is *analytic, convergent, vertical, focussed, objective, verbal and linear*, while creative thinking is *generative, divergent, lateral, diffuse, subjective, visual and associative*. Glassner and Schwarz, in some respects, echoing Simon's (1969) description of design as moving from "existing situations into preferred ones" (p.55), say "people need to analyse a situation before taking important decisions or while solving challenging problems" (2007, p.11). They further comment on the role of critical think as a means of "making sense" of situations (ibid). If we use, for example Swann's (2002) model of design process, then we can see that design requires both critical, or certainly analytical thinking and also synthesis, the bringing together of new ideas. So, it is argued here that if the act of designing requires different types of thinking such as analysis and synthesis, then praxis as a formally applied method, in which theory and practice are clearly articulated, students may develop a stronger understanding of the theory/practice relationship. If we accept Schön's position that knowing is indeed contained within our actions, then combining theory and practice together as praxis may yield beneficial learning results.

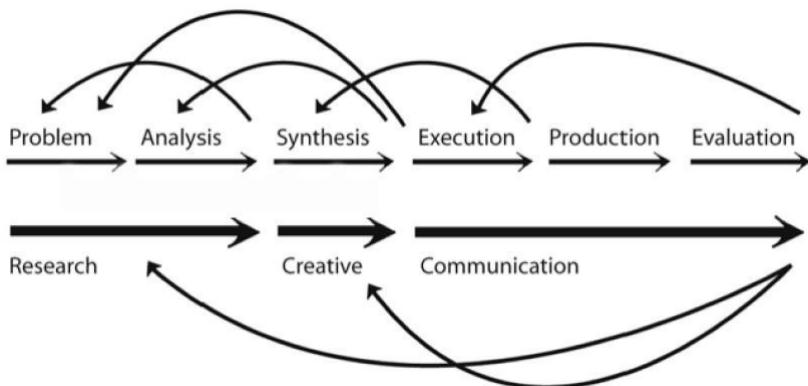


Figure 1. Swann's Design process model (2002). A development from Lawson's (1980) analysis-synthesis-evaluation model.

Methodology

Through the methodology of phenomenological heuristic enquiry, this paper will discuss students' understanding and experience of looking at theories and explaining their relevance through applied design practice. This methodological approach acknowledges the epistemological position that we can reflect on direct experience and meaningfully record it (Curtis and Mays, 1978, Schön 1983). To achieve *content validity* we must ensure that there are clear similarities between participants and the phenomena under investigation (Cohen et al, 2000). All students involved in this study were first year design students with similar educational experience, and all students worked on their own book. Phenomenological heuristic enquiries focus not only the personal experiences of participants, but also value the personal insights of the researcher. In some respects this has similarities to action research which also involves an 'inside perspective'. This is unlike other form of social science research which McNiff and Whithead describe as being "outside a situation" (2006, p.8). According to Patton (2002, p.107), "The reports of heuristic researchers are filled with the discoveries, personal insights, and reflections of the researchers". As a designer, and therefore 'insider', as opposed to an 'outsider', I therefore claim that I am well equipped with empathetic insight to analyse my own design students documented experiences.

As regards the research design of this study; while I do describe the learning activity of producing design outputs each week, in response to the theoretical content of the weekly lectures, as a 'learning intervention', this study can still be described as a *naturalistic inquiry*. Naturalistic inquiries examine real life situations such as a classroom activity and do not intervene or attempt to affect the experience which is to be studied (Patton, 2002). To ensure that there were no ethical issues involved, no research took place during teaching. Only once students had been assessed and received their grades were they

then asked to participate in the research project. This involved them giving permission for their work to be analysed as data. The work was handed in as a digital submission and included student's weekly diaries, the final Ebook and a digitally recorded presentation in which each student described their work. This was further supported by responses to a questionnaire given out to all students. Participation in the questionnaire was voluntary and not prescribed as compulsory. Seventy five students provided signed consent to participate in the research. Ethics permission was granted by the university's ethics committee.

Data

The data is based on:

1. Collected ebooks from 75 students who gave consent for their work to be used as research
2. Weekly digital diaries
3. A questionnaire with seven questions
4. An audio visual digital presentation given by each student

QCA 1530 Applied Practice is a first year course in the Bachelor of Design Degree at Griffith University. The course descriptor says:

This course will explore some of the methods, principles, processes and theories that makes design a special form of human inquiry. From analysis to synthesis, students will apply their understanding of 2 and 3 dimensional space through a series of linked, practical exercises, active visual experimentation and resolved production. Through 'praxis', i.e. the convergence of theory and practice, students will apply their understanding of design to real outcomes.

While the overall lecture series theme for the first year students revolved around discussions from academic literature as to what it takes to define and understand what design is, each week had a specific focus. Week one and two, in addition to introducing novice students to design terminology such as divergence/convergence, analysis/synthesis and various design process models, looked at the role analogical reasoning plays in creative problem solving. Week one looked at analogy and week two developed this further by looking at metaphor. In week three the focus was on anthropology and ethnography and weeks four and five looked at theories around narrative.

Analysis

I will now discuss findings gained from the questionnaire. The questions focused on the students' experiences of the tutorial exercises in relation to what they learned.

The first question students were asked was: **Q1. Which of the weekly exercises in assignment 1 made the clearest link between theory and design practice?**

<p>Each lecture discussed current literature, theories and ideas about design as a field of practice. The five themes were chosen as a means of providing focus for students to produce a design which creatively explored the lecture themes. Each design was backed up by a short piece of academic writing with a maximum word count of 150 words.</p>	Analogy	29
	Ethnography	21
	Metaphor	11
	Storytelling	10
	Time	3

Figure 2. Student responses to question 1. One student said all exercises were equally clear and relevant.

To provide some depth and visual exemplars, this paper will look more closely at the two exercises which students found to help them make the clearest links between theory and practice, *analogy* (29 students) and *ethnography* (21 students). One student had no preference and answered 'all of them' (Jon).

The follow up question to number one was: **Q2. What was it about the activity in that particular tutorial which helped you make links between theory and practice, and what were those links?** The overall patterns which emerged from student answers related to the role kinaesthetic activity played in giving students the opportunity to make sense of the content of the lectures and the importance of relevance. The following student comments are representative of their experience of the tutorial exercises.

Analogy

Having to physically recreate what was learned in the first lecture [analogy] helped me to remember much more (Ryan)

Rather than just talking about what design is we created what we thought it was through an analogy which helped me further understand (Brett)

I liked that we were able to refer design to something we as humans can relate to (e.g. design is like baking a cake) (Mary)

Ethnography

Being able to really go outside to actively look for something that applied to what we learned (Zak)

It taught me to observe and look more into things instead of assuming that things are already designed to their fullest potential (Jon)

Linking ‘human centred design’ with the practical activity of finding a design to improve helped me understand empathy (Isabela)

Figure 3. Representative comments from student as to why these exercises helped them link theory and practice.

Students who chose Metaphor and Storytelling as their preferred weekly exercise gave similar answer to those who chose Analogy and Ethnography, citing their preference for the physical activity that each exercise required. The three students who chose Time did not provide an explanation as to why they chose this exercise.

Metaphor

The collage helped me get the Saussure references (Andy)

Storytelling

Made me see how a story and narrative can explain multiple concepts and theories (Jon)

Figure 4. Student answers tended to link the exercise to what they learned.

Analogy

With the analogy exercise students were asked to describe design by creating an analogy based on the heading '*Design is like*'. Through the medium of mixed media collage students were also encouraged to incorporate secondary

conceptual references which drew on content from the lecture. Students came up with lots of interesting analogies such as '*design is like a river: there are many paths it can take.*' Figure 4 provides an example of how one student is seeking to creatively explain design through the analogy of white light. She explains her concept about design as the coming together of different things '*we only see it [design] when all the various design processes combine together*' (Kate). The prism, which is made up of different colours includes the words, *empathy, research, analysis, synthesis, test, evolution*. They act as a secondary level of communication to the key idea being presented by the student.



Figure 5. Design is like white light, we only see it when all the various design processes combine together.

Within each double page spread students were encouraged to provide a short piece of text which referred to the literature discussed in the lecture relevant to their design and to also provide proper citations from the academic literature presented to students. In figure 6 the student discusses Herbert Simon and his reference to 'courses of action...'. Saussure and semiotics is discussed, as is *mapping*, the explanatory model by which analogies are explained as a process of linking a *target to source*. The student also explains their own analogical concept. Her idea also contains reference to Cal Swann's design process model, *problem, analysis, synthesis, execution, production, evaluation*, as a secondary signifier. She says:

'Analogy can be referred to as 'mapping' connecting together the complex and abstract with what is understood, or 'target to source'. The design process is

'the target while the hamburger is the source. Each layer of ingredient in a hamburger represents a process of design necessary to create a final product' (Jane).

01 ANALOGY

DESIGN IS LIKE A HAMBURGER: EACH INGREDIENT IS A PROCESS THAT CREATES THE PRODUCT.

Designers can action change by using creative and effective communicative techniques that challenge the existing, so the preferred may be achieved. According to Simon, (1969,p.5) design is "Courses of action aimed at changing [the] existing." Using our theoretical understanding of 'semiotics' – interpreted as the way we view and perceive symbols and signs of the everyday, designers can manipulate our reasoning to decipher one thing and interpret another. Otherwise referred to as 'analogy', allowing the intended message to be understood

Figure 4 and 5 Examples of the of analogy illustrating two comparable ideas through visual and written text.

Designers can action change by using creative and effective communicative techniques that challenge the existing, so the preferred may be achieved. According to Simon, (1969,p.5) design is "Courses of action aimed at changing [the] existing." Using our theoretical understanding of 'semiotics' – interpreted as the way we view and perceive symbols and signs of the everyday, designers can manipulate our reasoning to decipher one thing and interpret another. Otherwise referred to as 'analogy', allowing the intended message to be understood

through association of what is familiar. Saussure states, "Everything is based on relations" (Saussure, 1919, 1969, p.123). Analogy can be referred as 'mapping', connecting together the complex and abstract with what is understood, or 'target to source'. The design process is the target while the hamburger is the source. Each layer of ingredient in a hamburger represents a process of design necessary to create the final product.

Figure 3 Mixed media collage representing the idea of design is like a hamburger: Each ingredient is a process that creates the product.

Figure 6. Example of how students combined critical writing with a creative output.

Ethnography

In the ethnography exercise the theme of the lecture and tutorial was encapsulated by the title 'The Norman door'. It required students to spend the first hour of the tutorial travelling around the campus observing how other students interacted with man made objects. Students were also asked to find examples of objects within the campus, or within their home environment which they felt were not well designed. While, as with all the tutorials, students only had a few hours to respond to the challenge of finding a man made design which could be improved, the vast majority were able to identify existing designs and develop concepts as to how they could be improved. Student designs did not need to be fully resolved. Students only had to provide basic visualisations of the problem and provide enough visual information to suggest what a solution could be, essentially a 'proof of concept' approach. Figure 7 provides a representative example. The photo shows steps with a hand rail which the student suggested was on the wrong side of the steps. She provided a basic sketch which suggests a more effective and safe option by putting the hand rail on the other side. In her video

presentation she discusses Don Norman, Human centred design, the importance of observation, the significance of empathy with users and IDEO's Inspiration, Ideation, Implementation model. In her ebook she says:

'I learned in lecture 3 , having a good understanding of how design impacts the user and if their design needs are met its critical to design. I used this knowledge to redesign a set of stairs found on campus'.

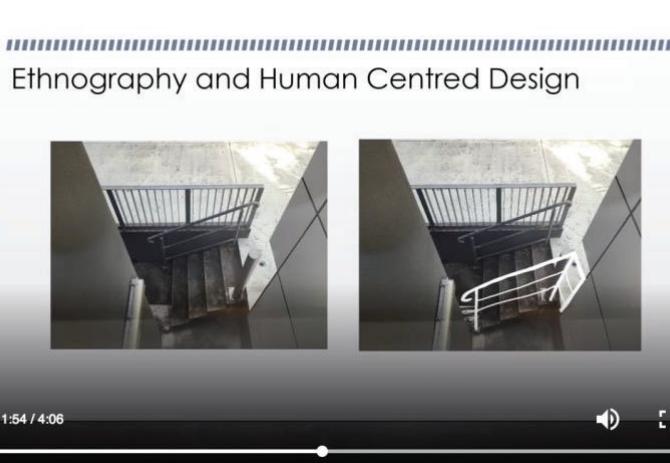


Figure 7. Extract from student's video presentation showing how an existing design could be improved.



Figure 8. Example of how student's provided a claim/evidence based audio visual presentation to further discuss their learning and elaborate on the content of their book. Left, video screenshot. Right, ebook text and image.

The examples provided in my discussion of the analogy and ethnography lectures and tutorials are, I believe a fair representation of student's overall experience of linking theory and practice. Students who preferred the other themes approached the design challenges with similar rigour, providing comparable academic back up in their ebooks and audio/visual presentations.

The other significant question in the questionnaire, relevant to this study was:

Q 3. Please describe what you learned by having to make something each week in the assignment tutorials and what did the making process do to help you understand theories about design?

Having a hands-on practice of our theories allowed me to understand the theory taught to a greater extent (Isabella)

Having to design something each week helped cement the learning-it no longer just became a theory-an idea (Bec)

I liked how we worked on new theories week by week as it allowed us to build on what we have learnt, it allowed the information to sink in (Mel)

Having to physically re create what was learned in the lectures helped me to remember much more about the content & how it relates to the real world (Jon)

It forced me to actually think about each concept and understand it instead of going home at the end of the day and just forget about it (May)

I learned how to apply the theories in practice, which ensured I understood each theory, because if I didn't it would have prevented me from making anything in the tutorial (Gary)

Figure 9. Representative comments from students to question 3.

Figure 9 responses highlight that, from the students' perspectives, practical, hands on, kinaesthetic learning can have a beneficial effect on students experience of attending theory based lectures and responding to their content through practical work.

Conclusion

This paper has attempted to demonstrate the importance of relevance and its significance to meaningful learning. As mentioned earlier in this paper, Mayer's (1996, p.4) constructivist position is essentially that learners are "sense makers" and that effective learning takes place when the learner "actively tries to build a coherent and meaningful representation of the presented material" (*ibid*). If students do not think of theory as being relevant to their learning then, if we accept Mayer's position, they will not seek to make sense of the material in front of them, i.e. theoretical content. Therefore relevance becomes, I argue a crucial ingredient in creating the empirical bridge. To make theory meaningful to novice design students the course Applied Practice was developed to make a very explicit connection between theory and practice. A praxis based approach is not uncommon in design studio teaching, but this paper argues that theory/practice connections should be made explicit and

clear, not simply embedded into course content and assumed that relevance will be noticed. There is, in general, a growing and positive trend to make design learning more explicit (Augustine and Coleman, 2012; Conole and Willis; Cross, 2001, 2007; Friedman, 2002; Kelly, 2016; Oxman, 2001; Norman 2000). Oxman (2001, p.73) describes this changing educational landscape which requires a more explicit understanding of the processes of design, as the "third paradigm", and refers to the Atelier model as the first paradigm and the Bauhaus as design's second educational paradigm. Fluss's comment that to teach theory we start "with the problems and examples that are meaningful to the students" (2009, p. 185) resonates with me. Student comments captured in this study from video presentations and questionnaire responses (Figures 4, 5 and 9), while unique to each individual, displayed recurring ideas about how hands on practical activity and creative responses to theoretical content helped students see the value of theory as a way of making sense of things. The learning intervention in this course was not simply embedding theory into a studio course through a praxis based approach. The basis of the learning intervention, and essentially what I would describe as my attempt to create an empirical bridge, was to make the connections between theory and practice as transparent and as explicit as possible, then challenge students to make their own connections through practical activity supported by a small amount of academic writing. This explicit structure in which the lectures were directly aligned to the studio exercises acted as scaffolding so that clear links between the lectures and studio activity could be made. In addition to this, another part of this empirical pathway was to ensure the exercises given to students were designed specifically to test students understanding of theory, by giving them creative challenges which were meaningful.

The student experience of this course as explored through their ebooks, digital presentations, learning journals and questionnaire responses have provided some insights into how an empirical bridge between theory and practice can be achieved. It is hoped that this paper has helped advance the call to break down an apparent dichotomy which historically, and in contemporary times, continues to exist between theory and practice in design education. However, It does not argue that theory should exclusively be taught in an embedded format. I am sure there is a strong argument for the continuation of separate contextual studies courses which explore theory exclusively through critical writing. However, most of our students do not seek academic careers and many still continue to see theory as irrelevant to design practice. Nevertheless, to advance this third paradigm of design education into an era of explicit understanding, we do need to make theory more relevant to practice. This paper has provided some suggestions and examples as to how this can be achieved. As regards where to from here?, I will cross that bridge when I come to it.

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The Contribution of the Vertical Design Disciplines to Design Thinking

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Abstract

This paper investigates the characteristics of the contribution of the vertical (traditional) design disciplines to design thinking and ways to support design students' motivation to participate in design thinking courses. The questions are examined through a case study where students from six design disciplines engage in a design thinking course and are explicitly encouraged to include approaches from their respective disciplines. Findings indicate that the inclusion of the vertical approaches lead to heightened motivation and passion about the project, a change in the team dynamics from 'talking' to 'creating' and a general acceleration of the design thinking process. Interestingly, a pattern surfaces: Design students associate design thinking with a set of qualities that sharply contrast with those of their specific design disciplines: Collaboration versus individual work; slow versus fast-paced; talking and writing versus sketching and prototyping; abstract versus concrete; objective versus subjective; serious and disciplined versus passionate and playful. The finding mirrors existing research showing that the navigation between pairs of opposites enables and drives the creative process. Hence, the six sets of opposites identified in the present study can be applied as underlying dynamics and building blocks in the design of a design thinking process.

Author keywords

Design Thinking; vertical design abilities; design competencies; design students' motivation; design education; pairs of opposites; dichotomies.

Introduction

What can designers trained within the artistic, vertical (traditional) design disciplines accomplish when transferring their abilities to new areas of innovation and transformation? Ranjan, senior faculty member at India's National Institute of Design, makes the point that while many universities offer Master's Programs in design to students from other fields, such as engineering, the sciences and architecture, one or two years is not enough to make them into designers (Ranjan in an interview with Lomar, 2015, 162-163). By contrast, he says, design undergraduates have a far richer understanding of design at the end of their training. Ranjan builds his argument on years of experience and urges a systematic investigation of what makes students who are trained within the vertical design disciplines different from students in other disciplines. The present study takes a step in that direction.

The objective is two-fold: Firstly, design thinking is currently taught at every university in Denmark, and it is pertinent to investigate what specific contributions the vertical design disciplines make when they venture beyond the traditional design context, in other words, to explicitly define and articulate how designers 'design think'. This can help formulate a theoretical framework for what constitutes the artistic, vertical designer competencies; it can help design educators foster the development of these competencies in their students, and it can provide professional designers with the ability to articulate their competencies and ways of working when collaborating with people from other fields. Secondly, research and previous course evaluations demonstrate that while some design students find cross-disciplinary design thinking courses to be exciting and relevant to their practice, others are demotivated, claiming they are irrelevant to their 'real' practice e.g. fashion – or game design (Dorst, 2015; Friis & Gelting, 2016; Friis, 2016). Finding ways to integrate disciplinary approaches (without compromising the unframed problem solving inherent in design thinking) might support students' motivation.

The paper starts by relating the theoretical foundation for the design thinking course, the layout of the course and the learning objectives. Next follows a description of the research approach, the empirical data and the initial findings. These findings are then analyzed using existing theories on design ability, design thinking, creativity and motivation leading to the conclusion.

The Design Thinking Course

Several discourses exist within design thinking (Kimbrell, 2011; Johansson-Sköldberg, Woodilla, and Cetinkaya, 2013). The present design thinking course adheres to a discourse where design competencies and practice are applied as means of innovation and transformation (Johansson-Sköldberg et al., 2013, 128). It has been labeled 'the expanded field of design' and is well-suited for complex, dynamic, open, and networked challenges in organizations and in society (Dorst, 2015). Design thinking within this discourse consists of a strategy and a set of methods, including anthropological approaches, visualization and prototyping that can be applied by non-designers and designers alike, often in collaboration across disciplines. It is characterized by unframed problem solving (Dorst, 2015; Friis and Gelting, 2016; Friis, 2016) where neither the exact challenge nor the solution is known in advance, only

the desired outcome. Hence, the problem field must be investigated in order to identify the challenge before creating a solution.

In the present course, The 6C Model (Figure 1) is applied as the main theoretical model. However, students initially study and work with a number of design thinking theories in order to provide them with the understanding that there is more than one design thinking model or process. The 6C Model was first developed by examining how design students produce knowledge in a design process and compared to theory addressing knowledge production in creative work processes (Friis & Gelting, 2014). The study revealed two different ways of producing knowledge and two different focuses of the knowledge production illustrated in the two axes of the model. The vertical axis shows how knowledge production transpires through physical experience or mental processing (Basadur, 2004). The horizontal axis indicates the focus of the knowledge production, which can be on the present situation or the future situation (Simon 1969; Liedtka 2004). This led to four central categories: Collecting and Comprehending information about the existing situation and Conceptualizing and Creating opportunities for the future situation (figure 1). Two categories considered to be central aspects of design thinking work have been added, namely Collaborating (internally in the team) and Communicating (with external stakeholders) (Friis, 2016).

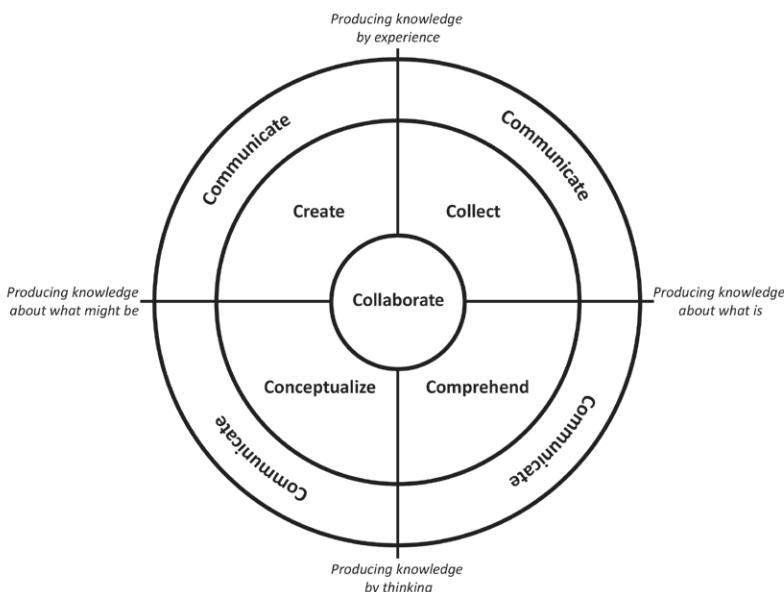


Figure 1. The 6C Model illustrates six categories significant to a design thinking process (Friis, 2016).

The 6C Model is accompanied by The Co-Creation Cards, a box of 89 physical method cards consisting of a picture page and a text page explaining the method and providing an example of how to use it (Friis, 2015). The cards are classified into six categories with 10-17 methods in each category covering the major activities in the creative process: collaborating, collecting,

understanding, conceptualizing, creating and communicating. The primary purpose of the Co-Creation Cards is to create a shared process language that, together with the 6C Model, serves as a tool for dialogue to be used by individuals, teams, facilitators and teachers and as a way to organize and drive the creative work processes forward.

The methods are based on the work of a wide range of researchers and practitioners with a focus on knowledge production, creativity, design and innovation. When possible, the methods are referenced. For instance, 'Who's Around the Table?' is a method in the Collaborate category inspired by the work of Basadur (1994, 2004), Darsø (2001, 2011) and Justesen (2008); 'Semi-structured Interview' is a method in the Collect category and based on research by Kvale (1996); 'Challenge Framing' is a method in the Comprehend category inspired by Basadur (1994); 'The Whole House' is a method in the Conceptualize category inspired by Scharmer and Kaufer (2013); 'Drawing and Sketching with the Other Hand' is a method in the Create category based on the research of Capacchione (2001), and 'Road Map' is a method in the Communication category based on the work by Friis (2015).

The Layout of the Course

The design thinking course is six weeks long. The objective is for students to experience and learn design and collaboration methods as part of addressing a complex, unframed challenge. Students work in teams of 4-5 participants from different sub-disciplines. The work is project based. The students are introduced to an overall challenge, in the present case 'How can we increase biodiversity in Copenhagen?', and they must study the topic and the situation in order to identify stakeholders as well as significant challenges and opportunities. The categories in the 6C Model are subsequently introduced to allow the students to become familiar with, choose, and experience methods in each category. The solution format is a video documenting their process, the stakeholders, the challenge and the final solution.

The Research Approach

The study is based on a case where 80 design students from six disciplines participate in the design thinking course. It is a qualitative inquiry into the approaches, methods and skills that the students perceive as significant to their disciplinary practices, e.g. fashion, game, visual communication, textile, furniture, and spatial design. The objective is to make a systematic study of the links between the design practice within vertical areas of practice and design within an innovation and transformation discourse. The study consists of two data sets.

The first dataset comprises a qualitative two-part questionnaire, presented half-way through and at the end of the course that the students fill out anonymously. The questions in the first questionnaire concern the approaches, methods and skills that they use in their individual design disciplines, what they feel is missing in the design practice and how they might include these approaches, methods and skills in the current process. The questions in the second questionnaire focus on the approaches, skills, and methods they were able to bring to the process and the effect – in regard to themselves, to the team, to the project and to the process. The second questionnaire is significant in that it expresses not only the students' *thoughts* about what they

might include in the design thinking process but also what *actions* they were able to take.

The responses have been transferred to two documents listing every student's reply to the first question, the second, the third and the fourth question, so as to compare what is being said in relation to each of the questions. Next, the students' statements have been clustered in terms of the meaning they express, for instance, 'hands-on experimentation', 'hands-on', and 'physical experimentation' are placed in the same cluster. The clusters are related and discussed in the section 'Empirical Findings'.

The second data set is a digital course evaluation conducted by the institution at the end of each course. It is qualitative as well as quantitative, similarly filled out by the students individually and anonymously. Questions range from overall course satisfaction and the number of working hours spent during a week to descriptions of what the students enjoyed and disliked about the course, their learning curve and their views of the pedagogical approaches applied in the course.

In the analysis the empirical findings are examined from the perspective of existing theories on design thinking and through creativity and motivation theory in order to discern the significance of explicitly integrating approaches from the vertical design disciplines into design thinking projects.

The Empirical Findings

The approaches mentioned by the students three weeks into the course and looking back at the end of the course have been clustered into six categories: 'Making Something: The Hands-on Experience', 'Individual Work', 'Experiment and Play', 'Artful Creation: Feeling & Passion', 'Divergent Thinking', and 'Fast Work'. The categories are described below.

Making Something: The Hands-on Experience

Every student without exception mentions the physical, hands-on experience of 'making' something as an integral and essential part of their practice. Whether in the form of collages, models, analogue or digital prototypes, sketching, textile printing, weaving, book bending, collages etc. The majority express that they miss these approaches in the design thinking course, e.g. 'I miss the hands-on approach. Scale models + working with different materials'. For many of the students, the experience is related to the sensual qualities of the materials, the colors, the layout etc. Three weeks later, the majority of the students are happy to have brought in hands-on approaches and materials from their disciplines: 'I brought in principles from weaving, model building, prototyping and sketching'. They have succeeded in making prototypes in wood, metal and ceramics, visual identities, animation etc. and think it helped move the process forward by creating a focus for the team: 'We became more precise in our communication, in setting our goals, in our shared understanding and wishes' and 'Everybody contributed and benefitted from each other's efforts'. Some students are dissatisfied, either because they failed to succeed in bringing their own approaches and skillsets to the table or because what they did was too basic for them and did not help them develop new disciplinary skillsets.

Individual Work

Many students state that they miss independent work/working individually. In some of the replies the need seems to be to work alone: 'More freedom to do what I want, freedom to focus on my own projects', but the majority want to first work alone and then get together with the team: 'Working by myself for a while and then talk to someone again'. In the responses at the end of the course, several students described that they were able to divide tasks in the group, do individual work according to their strengths and then come together in the making of a shared project: 'After you brought it up [inviting approaches from their individual programs], we divided the tasks between us. So one worked with the visual identity and two worked with prototypes which we used to develop our product'. 'It became easier to talk about the project when looking at concrete proposals for solutions' and 'we were able to identify what was missing, [...] it felt like we would reach the goal, not just when I make something, but when everybody makes something, closer to our respective discipline'.

Experiment and Play

Quite a few students mention that they miss the experimentation that takes place within their disciplines, the playing around when making something – they long for a less structured process. When looking back, several of the students mention that it became 'fun', they were energized by working with disciplinary approaches and felt excited. The ones who did not succeed in including approaches from their programs similarly feel dispirited and express being disappointed, either by the group, the process or themselves.

Artful Creation: Feeling & Passion

Some students mention that they would like to include the passion and the soul that they experience when working within their disciplines, e.g. 'My approach is more based on feeling'. They wish to work with aesthetics, creating universes based on what they feel rather than factual information. When looking back, many express that they enjoyed working with their disciplinary approaches: 'I felt like I contributed to the group with something that no one else could'. Also, the result became more artful: 'We got an artful twist throughout the project'. And, 'We made a mood board, started drawing, and our work space got more visual and nice'. In line with this, students who were not able to include disciplinary approaches are annoyed: 'I became dispassionate due to the fact that so few of my competencies came into play, e.g. illustration and animation'.

Divergent Thinking

Several students express the need to ideate and create concepts. Looking back, they describe their shared or individual contribution to ideation and conceptualization, 'We developed many ideas and approaches, leading us on in the process' and 'I felt I could create a concept and a brand around our project, which clarified the idea and the final product'. Still, a few students regret that their ideas were not included, hence indicating the significance of ownership and partaking in the divergence: 'I haven't got any of my personal visual ideas/solutions incorporated in the project ☺'.

Fast Pace

'Working Fast' is expressed by several students as something they miss and want to implement in the process. They experience that working together in a team is 'slow', there is 'too much talking', alas, working fast relates to getting things done and trying things out, and this is something they miss doing individually. They want to 'develop products' and 'create new results' and appear fatigued when asked to do research. At the end of the course, several students mention that working with the solution changed the team dynamic in a positive direction, that flow arose when the talking stopped: 'It became much more fun to work with. I could see how the project developed'.

Analysis

In the following analysis, theories on design abilities, design thinking, creativity and motivation are included in order to illuminate the question of the students' motivation when consciously including sub-disciplinary approaches, the design abilities as suggested by the students, and ways in which these abilities contribute to design thinking.

Motivation

The empirical data suggests that the majority of the students are able to include their disciplinary approaches in the design thinking process and that this leads to increased, individual motivation and passion about the project, a change in the team dynamics from 'talking' to 'creating', and the experience of moving forward at a faster pace – things are coming together for them. While the data is consistent, the changed perception might also be due to the fact that the students were entering the second half of the process, often a time of speeding up and 'making stuff', and the part of the process where most designers feel at home. Says Dorst, "[...] designers can display an over-eagerness to define the nature of the solution early on in the process [...]" (Dorst, 2015, 28). Hence, a reason underlying the responses could be that the students are simply relieved to have passed the problem-investigating phase. However, compared to previous courses, there is a significant drop in the number of students who deem the course irrelevant to their practice. In 2018, 80% said 'yes' (20% said 'no') when asked: 'Were you satisfied with the course overall?', whereas only 63% said 'yes' in 2017 (37% said 'no'). In regard to whether they have developed their skills and competencies, in 2018, 66% said 'yes to a great or adequate extent' and 24% said 'to a lesser extent' whereas in 2017, 46% said 'yes, to a great or adequate extent' and 39% said 'to a lesser extent'. Since the course layout and topic in 2018 is a repetition of 2017, responses indicate that the deliberate inclusion of the students' vertical design disciplines is motivating to them. Says one student looking back: 'I wanted to get more hands-on experience into the process. I used that idea of making scale models for the group in the wood workshop [...] it was great!'

To further understand why design students likely feel motivated by including approaches from their individual disciplines, one might turn to Collins and Amabile's work on creativity and motivation (Collins and Amabile, 2010). They coin two types of motivation: extrinsic and intrinsic motivation. The former is defined as '... the motivation to engage in an activity primarily in order to meet some goal external to the work itself, such as attaining an expected reward, winning a competition, or meeting some requirement ...' (ibid., 2010, pp. 299–

300). The latter is '[...] the motivation to engage in an activity primarily for its own sake, because the individual perceives the activity as interesting, involving, satisfying or personally challenging ...' (ibid., 2010, p. 299). Intrinsic motivation is by far the most important to creativity, because loving what one does will naturally provide the curiosity and persistence important to the discovery of novelty. Looking at the data, the students explain what they miss from their individual practices – the types of work that they are passionate about. Being invited to actually include those approaches and materials raises their energy and excitement. For those who succeed in implementing their practice, the excitement seems to last, and the approaches themselves contribute to the work, whereas those who failed to succeed experience disappointment.

The Vertical Design Abilities

The students' responses suggest that the vertical design disciplines contribute to design thinking processes by applying open, hands-on experimentation and divergent and abductive thinking. What is not known is investigated by the help of artful, playful, and subjective approaches, in individual, fast-paced work processes, enabling the designer to return with concrete proposals that can be discussed within the team. This might not be surprising to practicing designers; however, it is important to articulate for instance in design thinking work with participants from other disciplines.

In the following, the findings are compared to existing research on the nature of design ability. Nigel Cross, drawing on 30 years of research into design activity and the behavior of designers, summarizes design ability as the ability to produce novel, unexpected solutions; work with incomplete information; apply imagination and constructive forethought to practical problems; use drawings and other non-verbal modeling media as a means of problem solving; resolve ill-defined problems; adopt solution-focusing strategies and employ abductive or appositional thinking (Cross, 1990, 133–136; Cross, 2007, 12). Abductive thinking and the application of imagination and constructive forethought to practical problems as outlined by Cross are both found in the present study in the students' desire to generate ideas, to experiment and play and to work towards solutions. Also, the use of drawings and other non-verbal modeling media and the solution-focusing strategies identified by Cross are mirrored in the students' longing for hands-on experience and attaining results. Aspects mentioned by Cross, which are not explicitly expressed by the students, are overall characteristics such as the production of novel, unexpected solutions, working with incomplete information, and resolving ill-defined problems. This is not something the third-semester students are likely to say when asked about disciplinary approaches, methods, and skills. The wording applied by the students in the present study is operational and less abstract, and new aspects and nuances surface, for instance, the individual work, the shifting to a fast pace, experiments and play and applying feeling and passion. Feeling and passion might relate to the intuitive thinking described by Cross, but might also relate to working with something personally meaningful as described by Collins and Amabile (2010).

Navigating Opposite Positions

When looking at the students' responses, there seems to be a shared understanding across the sub-disciplines of the qualities of design thinking work when compared to work practices within their individual disciplines. This is surprising, and a pattern in the responses emerges: The design students associate design thinking with a set of qualities that are contrary to those of their respective design disciplines: Design thinking is collaborative, characterized by talking and writing and convergent thinking, the research is facts-based, understanding happens in the abstract, it is objective, it is a slow process, and it is 'serious'. In contrast, their disciplinary practices are perceived as independent, solitary work, characterized by hands-on sketching and prototyping and divergent thinking. The research is based on individual feeling and passion, it is less structured, understanding happens by making something concrete, it is subjective, it is a faster process, and it is fun.

The perceived differences are likely influenced by the timing of the hand-out and possibly by the course layout. However, they do not entirely account for the emerging pattern of dichotomies. Existing research supports the identified dichotomies, for instance the creative problem solving model by Basadur (2004), which is based on two sets of opposites, namely the movement between divergent and convergent processes and experiential and mental processes. Similarly, in a qualitative study of what makes people creative, Csikszentmihalyi found that being able to navigate between opposites is a central trait, e.g. being extrovert when networking and sharing information and introvert when working through information; conservative when studying within a domain and rebellious when breaking down the walls of that domain; being disciplined and being playful etc. (Csikszentmihalyi, 1996). He explains that it is the ability to move between these extreme positions that enables and drives the creative process.

Similarly, in the present design course, there appears to be a desire among the students to move away from the abstract, the theoretical, the objective and the analytical towards the concrete, the practical and the subjective and to synthesize what has been learned. However, while the design students appear to have a preference and a talent for the latter activities, Csikszentmihalyi would argue that it is the movement between the opposites that is vital to a successful creative process. He suggests that most people will see one side of the opposites as 'good' and the other side as 'bad', thus inhibiting their creative abilities since one needs access to both sides (Csikszentmihalyi, 1996, p. 57). In the present study six sets of opposites central to a design thinking process are identified: The ability to move between divergent and convergent thinking, between collaborative and individual work, between being subjective (what do I feel/think?) and investigating the perspectives of stakeholders (what do they feel/think), being able to move between slow pace and fast pace and between thinking and doing. The playful experimentation and attaining results might be countered by a more serious, disciplined approach. These pairs of opposites can serve as a compass for individual learning, supervision and training in the creative process, e.g. identifying individual strengths and working to ensure that the other, opposite quality is developed as well, not necessarily to the same degree, but sufficient to enable the inclusion of and navigation between opposites.

Changing the Frame

To bring the analysis back to design thinking, the following section provides a window to existing research on design thinking ability. Dorst focuses on 'framing' as central to 'design abduction' (2015, 24). In line with Cross, he argues that '[...] in expert design practice, the design problem is not fixed before the search begins for a satisfactory solution concept' (*ibid.*, 2015, 24). The starting point is the consequences and desired outcomes from where the movement goes backwards to figure out what could be created and how to do it. Also, the solution and the problem are developed and framed iteratively, in parallel. Still, the initial phases focus on getting acquainted with the problem field and the stakeholders (*ibid.*, 2015, p. 23–24). Like Dorst, Ranjan points to the transportation of design competencies to new areas, arguing that designers are the only ones capable of critically reframing problems – or at least designers have the potential to do so. He says, 'In design, the intention is not only to make the product better, but in some cases, to replace the product altogether' (Ranjan in Lomar, 2015, 161). He sees playfulness as a way to move beyond familiar, limited frames, and thus a key aspect of framing and reframing problems. Ranjan also mentions the ability to collaborate, to perceive something from other people's point of view, and to incorporate the required disciplines from outside. The suggestions by Dorst and Ranjan are mirrored in the present course set up, where students work collaboratively with framing of challenges and solutions. However, including the playful trial-and-error approaches and the problem-and-solution conjunction earlier in the process, as suggested by both of them, might provide students with motivation and information that will be fruitful to the process and project.

Conclusion

The present study sets out to shed light of the implications of explicitly integrating approaches from the vertical design disciplines into a design thinking project. The objectives are two-fold: one is to disclose the particular characteristics of the contributions of the vertical design disciplines to design thinking work. The other is to find ways to support students' motivation to participate in design thinking work. Both are important as The School of Design, in line with Dorst and Ranjan, seeks to educate designers who are able to work within the vertical design disciplines *and* are capable of transferring their competencies to new areas of sustainable innovation and transformation.

Starting with the motivation, findings indicate that students get motivated by including approaches, materials and skills from their individual design disciplines. They feel excited and inspired and appear to be intrinsically motivated. In future courses, this finding could lead to adjustments in the program, for instance inviting students to come up with disciplinary design approaches earlier and repeatedly during the process, through solution conjecture before the problem is identified. This would mean quicker and not necessarily linear iterations between Collect, Comprehend, Conceptualize, and Create in the 6C Model. At present, the intention is for the students to spend time investigating the field of the problem before moving into the solution space, but including pockets of solution conjecture, even in the first weeks, in line with Cross and Dorst, might support motivation and provide insight into the nature of the problem.

In regard to the contribution of the vertical design disciplines to design thinking work, the study suggests that they contribute with open, hands-on experimentation, divergent and abductive thinking, enabling the investigation of the unknown by applying playful, feeling and subjective approaches, a faster speed, working individually and returning with concrete proposals that can be discussed within the team. Interestingly, a pattern surfaces: Design students appear to associate design thinking with a set of qualities that are contrary to those of their respective design disciplines: Collaboration versus individual work; slow pace versus fast pace; talking and writing versus hands-on sketching and prototyping; abstract versus concrete; objective versus subjective; serious and disciplined versus passionate and playful. This might, in fact, be the reason why some of them shy away from design thinking. Acknowledging this pattern could be helpful to design educators when setting up design thinking courses, being aware that students likely have preferences and are motivated by particular aspects of the process (while also needing to learn to develop the opposite qualities). The six sets of opposites identified in the present study can be applied as underlying dynamics or building blocks in the design of a design process, e.g. switching between divergent and convergent activities, between experiential approaches and mental processes, introducing collaborative exercises followed by individual work, setting the pace differently for different exercises, switching between individual perspectives and investigating the perspectives of others, and finally between playful and more serious activities.

It is important to note that the key aspects identified by clustering the students' responses is a snapshot from a single case study and that more data is needed to fine-tune and differentiate the findings and build validity. Also, the students are second-year design students, still 'young' in their practice. Interviewing and observing fourth- or fifth-year design students or professional designers could be a relevant next step. The findings in the present study set the direction for further research.

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Learning Design Process for Sense-Making

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Abstract

Design process has been analysed and modelled in various ways over past decades. A typical way to describe it is as the variation of divergent, generative and convergent, analytic-logical thinking modes. In design pedagogy, an interesting issue is how to guide design students in recognising the divergent, explorative and creative process skills while at the same time analysing communicable process structures. Design process models can offer possibilities of structuring and planning design work in understandable and explainable ways within professional education. Design process can also offer shared, jointly understood work structures for co-design teams and justifications for design decisions made during the process. Design process, typical process phases, approaches and methods as a clarifying tool for design education are explained in this paper with applications at both the BA and MA levels. At the BA level, the investigation of basic design process models and the structure of research, problem setting, ideation, conceiving, prototyping and testing have been developed as a pedagogical tool with tags for building one's own process and reflecting on it after the design project is completed. This paper presents student-based process-building and visualization examples that the students

have produced with the help of these tags of design process. The BA-level students start to build their basic design process path, visualise their team's project process after the project completion and they evaluate the execution and iterations reflecting their problem setting and creativity points. At the MA level, tackling professional strategic and process management challenges confronts growing demands with complexity and flexibility. A MA-level educational tool consist of cards of strategic and research based front-end design approaches. The MA-level students handle the growing complexity and methods required when reaching the strategic and managerial levels of design, which especially stress the front-end stages of challenge settings, generative design thinking and research based human driven concepts. The MA level also sets requirements of capabilities in designing and facilitating the co-design process for others to follow. At both the BA and MA levels, design education must provide case-specific process sense-making, including various stages and the diversity of methods that can support application to meet the contextual, material, immaterial and organisational design challenges. The building blocks, analysis and holistic visualisations of the design process during design learning seem to support understanding the process, reflecting on it and explaining it to others. Having the building blocks of the process is more advantageous than stable models in learning how to apply the process structure and methods in different ways to context-specific design cases. The drafting of the process with several options also allows learning about the flexibility required for coping with the ever-changing real-life contexts and stakeholders.

Author keywords

design process, design education, sense-making, creativity, evidence-based design

Introduction

The long history of sense-making of the design activities in a design process has resulted in this process being described with many models. The models usually define the stages of the process as well as the typical variations of divergent and convergent thinking. In teaching design process, the process phases and methods can work as a good tool to support students' understanding of how they can carry out the work required in the design profession. The learning of design involves gaining an intuitive understanding of the design process that can then be applied to various design cases. This paper describes how process understanding and communication can help in recognizing the points of task setting and creativity during a design task at the BA level. The process also clarifies the different types of approaches required, such as research, ideation, synthesising the solutions, prototyping and testing. At the MA level, the basic design process grows into a design thinking process with requirements of strategic development and process management skills. These requirements emphasise the future-orientated and questioning front-end stage of the process. They also present the design professional as the designer of the co-design processes for multidisciplinary teams.

The Design Process Challenges in Design Education

Dubberly (2004), in his extended 145-page analysis and modelling of design processes, describes the design process analyses reaching at least as far back as the 1960s. In the 70s and 80s, the basic ideas of the design process descriptions concentrated on problem solving. This already included the variation of divergent, and convergent thinking. Since then, the user-driven approach and application of different development methods have increased, and visual descriptions of design now entail both divergent and convergent variations as a way to pump development forward, and the specification of multiple methods in the different stages of the process.

After the turn of the century, one emerging way to describe a design process has been a double diamond process (Design Council, 2019). This has even been extended into a triple diamond process (You, 2016). These models clearly represent the nature of divergent and convergent processes. The Design Council (2019) divides this thinking variation into two phases both consisting of divergent and convergent thinking: phase one is discover and define, and phase two is ideate and execute. The double diamond has been widely used as the basis for service design and service design education. Winograd (2018) presents the Stanford University Design School design process as a necktie model, which is, at the end, a stretched version of the double diamond describing the typically long time the execution stage takes in comparison to the earlier stages. The stages described are understand, observe, point of view, visualise, prototype, test and iterate. As a variation of this, however, the basic process to follow in the latest version of the Stanford Design School Bootcamp bootleg instructions (Both & Baggereor 2018) includes the stages of empathise, define, ideate, prototype and test. Similar to the necktie type of a process, the IDEO (2018) design consultancy Human Centred Design toolkit presents a soft arch model, where divergent and convergent thinking move as soft waves along the necktie, softening the variation of the divergent and convergent working modes. In Figure 1, these models are presented visually, including an example of a different round type of model from the visual communication teachers, representing the difference in design disciplines.

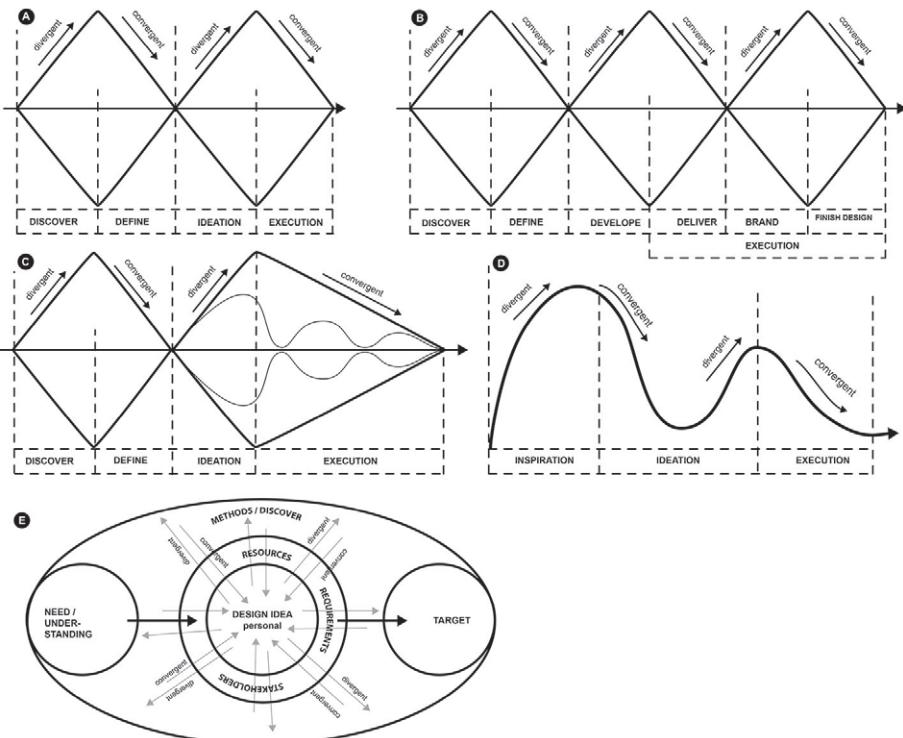


Figure 1. Double, triple, accordion and arch models of design process. A. Double diamond model (modified by Nylander 2015 from the Design Council Double Diamond). B. Triple diamond model (You 2016). C. Necktie model from the Stanford University Design School 2018 (Winograd 2018). D. Arch model – Human centred design toolkit by IDEO. E. Design process as explained by teachers of visual communication at the Lahti Institute of Design (Nylander 2018).

Even though design processes have been extensively analysed, Tovey (2015) has recently described how a typical habit in teaching design is to guide the student to become a professional by imitating the well-proven methods and processes from the professional field. According to Tovey, this pedagogical model rarely encourages the student to challenge the current design processes or to develop new approaches. Shreeve (2015) has furthermore described some signature pedagogies for design that organise teaching support into certain directions. The following activities and spaces define these model pedagogies:

- **Studio** – pedagogy as a learning environment and as a traditional design activity (Shreeve, 2015, 85-86)
- **Projects and briefs** –experimental way of learning where a written brief often describes the multidimensional nature of design (Shreeve, 2015, 86-87)
- **Materiality** – pedagogy, which involves learning by doing and building (Shreeve, 2015, 87)

- **Dialogue** – pedagogy based on exchange of ideas to try out. By inspiring, prompting and questioning, students are encouraged to contest the development case and make decisions (Shreeve, 2015, 88)
- **The Crit** – pedagogy establishes standards on how the thinking and evaluation match the given brief, provides positive feedback on performance and shares alternative perspectives on design possibilities (Shreeve, 2015, 88-89)

A currently popular way of teaching design is to use the design process and methods as guidelines and tools for the students. In Design School Kolding, the basic approach for design education comes from the possibilities of combining theory and practice. The idea is that, with the support from professionals and researchers, the student chooses the suitable design methods for the case. This provides new exciting and unexpected viewpoints. It also provides possibilities for professionals and researchers to develop the approaches and methods for design (Design School Kolding, 2016).

The research, development and collecting of the processes and methods has become typical both in design practices and at design universities (Curedale 2013; Boejien et al. 2014). In addition to providing new ways of applying design processes and improving design solutions, the process and methods development tackles the problem of verbalising the intuitive process. The understanding and even verbalisation needs of the process can be detected in the development organisation of The Finnish Innovation Fund Sitra and findings from Ornamo, a design trade union in Finland, which demonstrate problems that creative professionals have in verbalising their skills and processes (Poussa 2017). The demands of multidisciplinary development have increased the significance of this kind of verbalisation. Also, the change in design work to designing the co-design for multidisciplinary teams and users has made it vital for the designer to be able to externalise their workflow (Aminoff et al. 2010).

Designing the co-design also means increasing demands on externalising the creativity flows in the design processes. Wilson and Zamberlan (2017, 108) point out creativity as a major skill and, at the same time, a major challenge in design education. Support in creativity can be provided by creating connections between different disciplines, as multidisciplinary work practices do. The major educational problem remains in how to guide students in understanding the source of their individual creativity. It is also necessary to ask how to support students in understanding what joint creative work is. Several challenges exist in evaluating creativity:

- Deficiencies in understanding the pedagogical dimension of creativity
- Deficiencies in understanding and evaluating the different levels where creativity occurs
- The lack of necessary models and methods to evaluate and understand creativity

(Wilson & Zamberlan, 2017, 108)

So, even within the major skillset of creativity, which at least partly differentiates designers from other development professionals, there are deficiencies of pedagogical understanding and methods. The demands around creativity as a future working-life skill are increasing as is the importance of tackling the creativity challenge in design education. LinkedIn proposed at the beginning of the year 2019 that the future working-life skills begin with creativity.

Wilson and Zamberlan (2017, 108) point out that the lack of necessary models and methods make it difficult to evaluate and understand creativity in education. The design process models and visualisations of the process create tools for the students to discuss and evaluate both their process in general and specifically their creativity. The evolving models of design processes can provide an excellent tool for design education in depicting the stages and multimodality of design work. They can also help to tackle the major challenges of current design skills, such as understanding and verbalising creativity or designing the co-design possibilities for others.

There have been several attempts to provide method cards for creating the design process. The early IDEO from 2003 card deck described user-driven ideation methods to be used in the design process. At Design School Kolding, Friis (2015) has created cards that are based on a theoretical model of design process, where different methods are provided for the themes of collaborating, collecting, comprehending, conceptualising, creating and communicating. The purpose of these cards is to create a common language between the designers and the non-designers. These cards consist of 89 specified methods and solutions areas that would help to create solutions. In addition to co-design, these cards can also be used to support an individual design process. The methods-based cards concentrate on narrow incidents in the process rather than describing the major flows in the process. Similar material on methods exists representing the myriad of methods you can use to tackle the design challenge in various and even holistic ways (e.g. Krippendorff 2006; Curedale, 2013; Boejien et al. 2014).

Design process modelling with BA-level students

At the BA level, the main design process phases at the Lahti Institute of Design in Finland consist of design research with different methods, choosing design insight, ideation and testing, understanding the insight and executions as visual storytelling. During the 2016-2017 curriculum development, there was an understanding among the teachers that the design process is a central tool in the pedagogy. For improving the mutual understanding of the process in different subareas of design and media, a workshop was held where the teachers described their own understanding and emphasis of the process. In teacher discussions and process drawings, design process was described as something that creates new information. The processes that the teachers described included mapping the right design brief, creating the brief, ideation and visualising ideas and executions of design as prototypes and ready-made results. The teacher discussions resulted in many double and triple diamond-looking models as well as a model E (Figure 1) by the visual communication

teachers, which implies that insight is a central aspect of the process, while methods and process circulate it.

The mutually accepted understanding of the process guides student work in collecting, observing and selecting data. The next step is to understand and perceive the overall picture and frame of reference. This leads to creating the brief. After that, students are asked to create insights and new connections to their idea. Lastly, students are asked to test their idea by benchmarking, telling stories and visualising stories. The way the teachers describe the process is more theoretical than the process that students actually understand. The reason for this might be the fact that teachers have a more profound understanding about the process and expectations compared to the students, at least during their first study years.

The second-year students in the industrial design and branding department were asked to evaluate their design task after the course by drawing their process path afterwards. In comparison to the previously presented typical design process models, the results showed that the students had observed the variation in divergent and convergent thinking. They visualised their process more as the stretched necktie model than the double diamond type, since the ideation and execution took more time in a timeline than the front-end research. Students reflected that diamond-like models imply that all the parts of the process are the same, timewise, which is not actually true. Other models that were seen in students' drawings were similar to IDEO's arch model, where divergent and convergent thinking did not follow the process clearly, but the process moved, waving between them. The evaluation task given to the students included a list of different design methods and tools to clarify what they were. The instructions given to students for the evaluation task included the following.

"What did we learn about design process?

1. Draw with your team your design process as a timeline or path/journey (use one A4-sized paper). Mark into the process all the phases of the design work and methods you used. Your group might have used more than one method at a time.

2. Mark into your process the phase in which your design process was defined as a task as a "Brief", a design brief, which you are solving with the team at the end of the process. Mark the times that you used tools, such as workshops or computers, and when you discussed or created ideas for furthering and promoting your process.

3. In addition, think about the following. How did the methods you used help:

Make your thinking richer and more diverse – a divergent way to look for many options and solutions.

Narrow down your thinking – a convergent way to look for "either - or" - kind of solutions

..and reflect the reasons why you think this happened."

Students from industrial design department continued to evaluate the process drawings of their peers and noticed that the model looked more like a neck-tie model combined with an oval path. Based on their experience in design education, they found it important that the model should circulate back to its starting point. This was significant because the result came back to the project aim. Visualising the idea helped to understand this path and purpose. In the process model, the starting point and ending point do not touch, but designers somehow come back to answer the questions they have asked at the starting point. They also described the amount of work with the heavier line of the path way. Hence, they felt that sometimes there is more work in a shorter amount of time, and sometimes there is more time for ideation, for example. Students felt that it was important to understand the use of their time, since during studies, some methods of working are not yet familiar and might take more time. In reflection discussions, students expressed that, during one's studies, while being inexperienced in design process, the unknown future of the process might feel chaotic to them. Due to this, they suggested that using a process model as a pedagogical tool to show the expected direction, and then coming back to draw the process to reflect what has happened, would be helpful. They also felt that reflection of the learning, divergent and convergent thinking methods and creativity points helped them understand their work better. Better knowledge of the process and methods actually helped their creativity by giving the students guidance, even they were solving some complex problems. Showing the expected process at beginning of the design task helped students to understand the amount of time each step would need and plan their actions better.

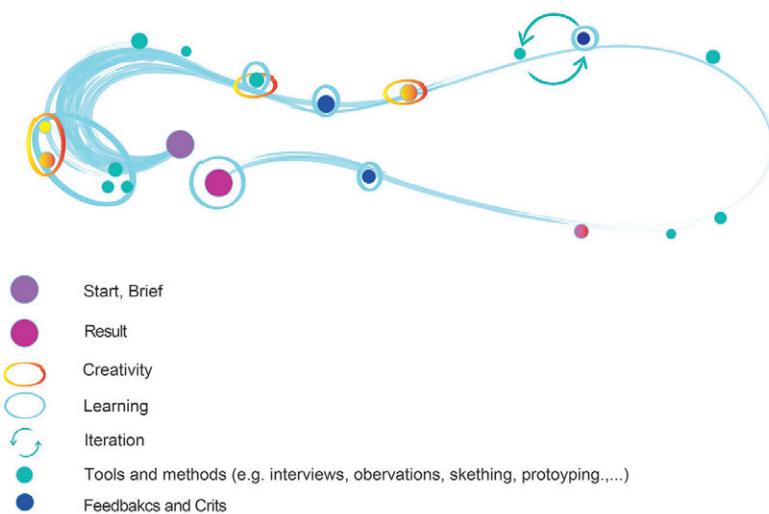


Figure 2. A collective design process description from student-created design process descriptions and reflections. Nurminen & Roine. 2018.

New tool to support design process and reflection

The realisation of design process as a reflection tool produced an idea to create a ready-made model and tags for students to use for drawing their design processes. In autumn 2018, during a sustainable design course, students of industrial design and branding were again asked to use the tool to draw their process. These new written and visual guidelines were provided, resulting a new type of feedback communication and helping to reflect in discussions what had happened during the design process.

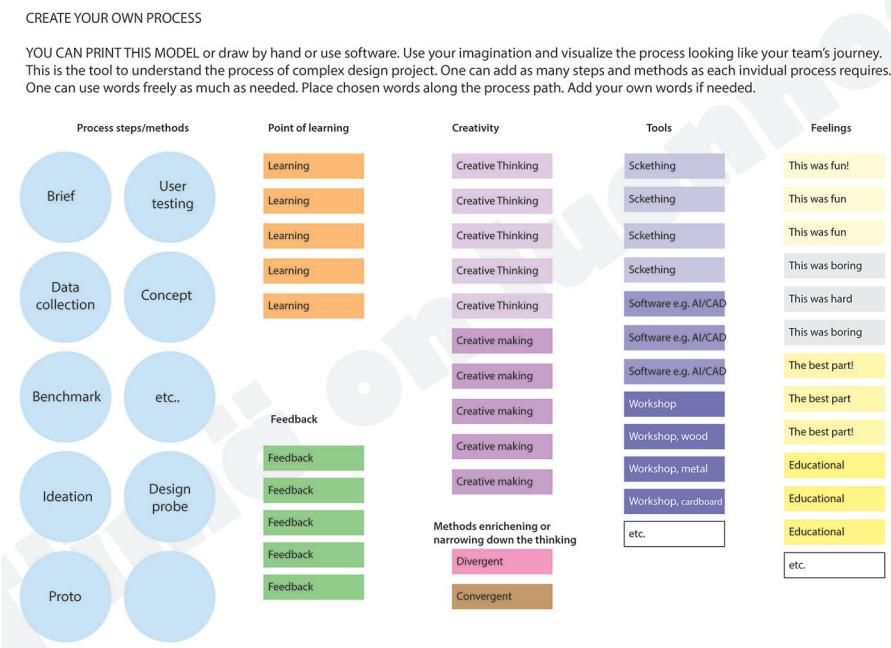


Figure 3. New learning tool to evaluate design process. Nurminen & Roine. 2018.

The added value of this reflection tool is to ask students to reflect on their learning and to specify in which parts of their minds the creativity happened.

Point of creativity in students' drawings (2017-2018):

- Being inspired by the research
- Testing and prototyping ideas
- Recognising and creating new connections between research and reality

Points of creative learning:

- Feedback through making and testing
- Feedback discussions and crits

Student drawings and reflections show that signature pedagogies that supported creativity were materiality by making and testing as well as dialogue and crit. The visual way of reflecting design process in project and brief pedagogy helped students to recognize the variation of other pedagogies happening during the process. This helped the students to understand their process and can be seen as an educational tool, which supports to build the students' professional self-knowledge and understanding unseen connections in creative process.

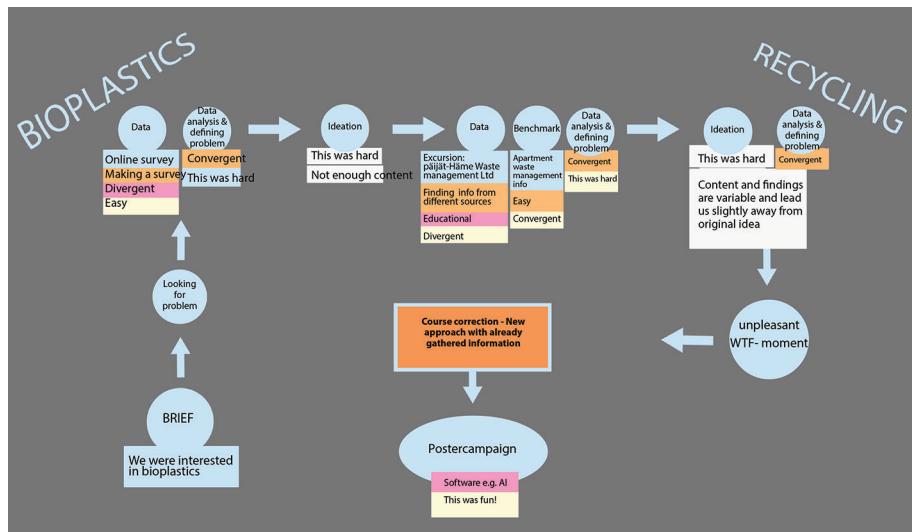


Figure 4. Student drawings of their process path with new tool on sustainable design project course. This example uses the tool. Juujärvi, 2018.

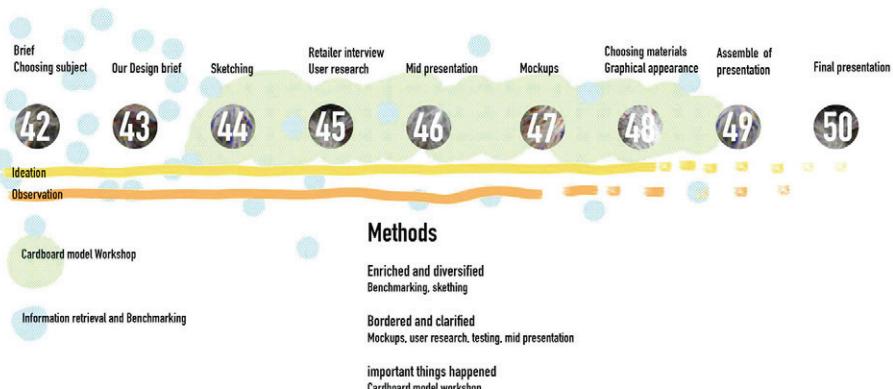


Figure 5. Student drawings of their process paths with new tool on sustainable design project course. This example is made freeform but with guidelines. Frimodig, Mäkkilä, Mäntynen & Tsokkinen, 2018.

Modelling the research and co-design processes at the MA level

In the comparable degrees of the Bologna process, the Bergen outcome (2005) specifies the qualification of the second cycle capabilities of higher-level studies into applying the knowledge and understanding, and problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts. The graduates should have the ability to integrate knowledge and handle complexity, and formulate judgments with even incomplete or limited information. Within polytechnic education in Finland, the entrance to MA-level studies requires at least three years of work experience, and the students often have an even longer work history. Following the MA-level requirements and the working-life needs of the students, the content of the learning is geared towards strategic design and management of the design thinking processes.

The modelling of the design thinking processes with the MA students in Design and Media has taken place at two levels. The first level includes the holistic planning of the practical but evidence-based development process for the thesis work. The second level entails the designing of the design process for others to be executed as co-design activities. The co-design approach has often been part of the thesis process, but has been studied and practised through other courses, such as strategic design and service design where the co-design activities are typical.

The thesis work process has included a compulsory visualisation of the process with suitable research approaches and specific methods according to the evidence-based design tradition. Curedale (2013) defines the evidence-based approach as a required design thinking skill for a working designer. The included development tools help to successfully target the design solutions and discover differentiation for the value creation in an increasingly complex consumer environment. The evidence-based design practices source methods from social sciences, psychology, ethnography and business studies in order to support

mapping the emerging contexts and stakeholders for the solutions. The combination of these methods with design thinking places design in close proximity to innovation practices. Hernández, Cooper, Tether and Murphy (2018, 249–262) explain in their meta-analysis how design can contribute to business success. Visual, methodological, and procedural design language has become an organising principle for supporting innovative initiatives, and it is even the language of innovation itself. The key roles that design activity plays in the innovation process have been found to include producing differentiation, exploring and understanding the user, collaborating with the user, articulating ideas and transforming ideas into concepts, and also introducing and facilitating the adaptation of innovations to the markets. Design was found to be central in innovation activities due to its creative and generative thinking process. This is also evident in the frequency of MA-level students in design and visual communication being drawn into designing the design process for others.

Creating the basic flow of the evidence-based development process has been supported by the idea of cards containing alternating divergent and convergent thinking modes and evidence-based high-level research and development inputs. These cards were created for the MA studies through design project management experience and research teaching experience at the Lahti Institute of Design. They describe the different approaches of tackling the generative fuzzy front end of design thinking-based development on a higher level than specific methods. These approaches and steps on the cards have been used when the students have considered the suitable applications of the process and methods in their real working-life development case at hand.

The variation between divergent, generative, exploring approaches and convergent analysing, synthesising and optimising approaches is the basis of the design thinking process. This variation pumps the development process forward. Even if there are typical stages in the process, they should be carried out with the different approaches and in the appropriate order, depending on the case at hand. The explorations aim at a holistic, multi-perspective view of the challenges and opportunities, until a saturation of insight is reached. The attached convergent analysis plays a part even in exploration but is necessary for combining and narrowing down the material for the results. At the MA level, these results often deal with the development of the design process or even an organisation's strategic-level goals and activity models.

The beginning of the project usually needs to start with the orientation to the development context, stakeholder analysis and the state-of-the-art situation mapping. This also requires using knowledge-based data sources for customer situations and competitive situations. The current mapping of the realities and systems allows for analysing challenges and opportunities. The process should also include questioning the evident problems and challenges, and the generation and variation of challenge solutions and opportunity-based solutions. A creative search using benchmarking or visual materials can be part of the generative sources. Strategic-level development requires searching for future trends, analysing the future, ideating future opportunities and creating diverse scenarios combined with the analysis of how to reach the desired future. As design thinking is based on human empathy-rich user and stakeholder information, empathy in analysing needs and wants and using human needs classifications or other research-based approaches can be applied. Later, choosing and optimising ideas come into play with synthesizing and building

concepts. Testing experiments and producing quick prototypes and concepts are often included, and finally, planning the production or implementation. Many of the stages can be carried out as a co-design with the different stakeholders, producers, customers or even financing partners.



Figure 6. The use of the approaches cards for contemplating the evidence-based development process alternatives. Clothing design case planning by Teuronen 2018.

Figure 6 presents an example of a development process for an MA thesis by a clothing designer. Above, there are some examples of the evidence-based design thinking process cards that are not necessary in this clothing design case. The lower process description is built with the suitable design process cards, and it looks at the possibilities of improving stakeholder collaboration with the Chinese production partners in the early stages of the clothing collection design. This case example for a tactical, process-level design development concerns one of the largest clothing companies in Finland, Luhta. The designer used the possibilities of the design thinking process initiating with rich iteration, analysis and mapping the ecology of the early stages of the design process. Then, she attempted to tackle the challenge of smooth collaboration with the Chinese production stakeholders. She tried to empathise with the Chinese insider and outsider design process representatives. She ideated solutions for integrating new, well-planned, concretising co-design workshops into the early stages of the design process with these stakeholders. The development took place in the real-life conditions of a new collection design process where the co-design workshops were prototyped and tested. The evaluation of the workshop testing led to co-designing improvements and sharing the gained results inside the company. Then, the designer created new collaboration guidelines, and the design team was able to continue joint co-design in improved and efficient ways.

The realities of management-level professional design work present the conditions of design applications with different types of businesses and organisations. The variation in MA thesis cases extends from heavy technology development-related solutions to ICT-based services, food, clothing, furniture, packaging, sports, and diverse cultural projects, and city-based or other public sector service solutions. Management-level issues include investigations into, for example, how to apply strategic design or multiple user-driven methods to specific business areas or public sector development, how to apply service design to brand development and how to design the co-design process for a multidisciplinary stakeholder team or for customer engagement. Many projects have also included future forecasting perspectives. All of this points to the work in the fuzzy conditions of volatility, uncertainty, complexity and ambiguity (VUCA) (Bennett & Lemoine 2014). In light of the working-life challenges faced by the MA students, the VUCA situation is typical within the management conditions of current design work.

The playing around with and searching for evidence-based design approaches using the visual cards provides insights into the design thinking process in these kinds of conditions in many ways. The cards show that there is more to design process than the structures of double diamond or other simplified design process structures, which may not necessarily work in complex realities. The manipulations of the order of the different approaches with the cards is possible and shows the concurrent nature of the triangulation of approaches as learning experiences that are often necessary in complex practical contexts. In the first-generation phase, there is a need to support building the holistic picture of the development challenges and opportunities. The process with this iteration becomes evident when the students can easily change the order and composition of the approaches with the cards. The idea to construct the higher-level approaches to the case first, and only then specify the research and development methods, is also beneficial since it prevents the students from taking the trendy or obvious design research methods into use and makes them think more carefully about what methods suit the intended process best and how they could be modified to suit each case.

The training with building the evidence-based design thinking process with other studies also supports the design understanding for co-design processes. Much of the MA thesis work includes managing co-design activities. The important learning in them comes with dealing with time issues combined with the VUCA elements of current working-life. The co-design processes in various real-life projects tend to last for months or even years. The currently typical turmoil in organisations hits the co-design processes so that, even as a thesis worker, one needs a Plan B in order to manage these realities.

Our example of this kind of changing development contexts is from a department store business case. The thesis development aimed at the co-design process of the customer-orientated guidance concept for specific department store environments of Stockmann, the oldest department store chain in Finland. The work was supposed to be conducted within months by a multidisciplinary in-house marketing team. The idealistic plan for the design of the co-design process consisted of a) mapping and understanding, b) forecasting and ideating, c) modelling and evaluating, d) conceiving and influencing. The purpose was to apply multiple methods in each of the stages. The stages involved using the existing customer information, gathering and applying relevant trend

information and observing actual customers in action. Also, the different forecasting, ideation, concept building and prototyping methods had been planned to take place. In the Plan B, forced to be executed in the real-life development situation, there were some reductions of methods due to the lack of time and staff member enthusiasm and to the iterative understanding that the saturation of information had already been reached. In the end, the concept team had to be re-organised due to drastic employee changes within the business organisation. A new outsider professional group was brought in for concept creation, and positively represented the customer point of view, which was seen as a justified means for carrying out the final work when the in-house marketing team was unable to do it.

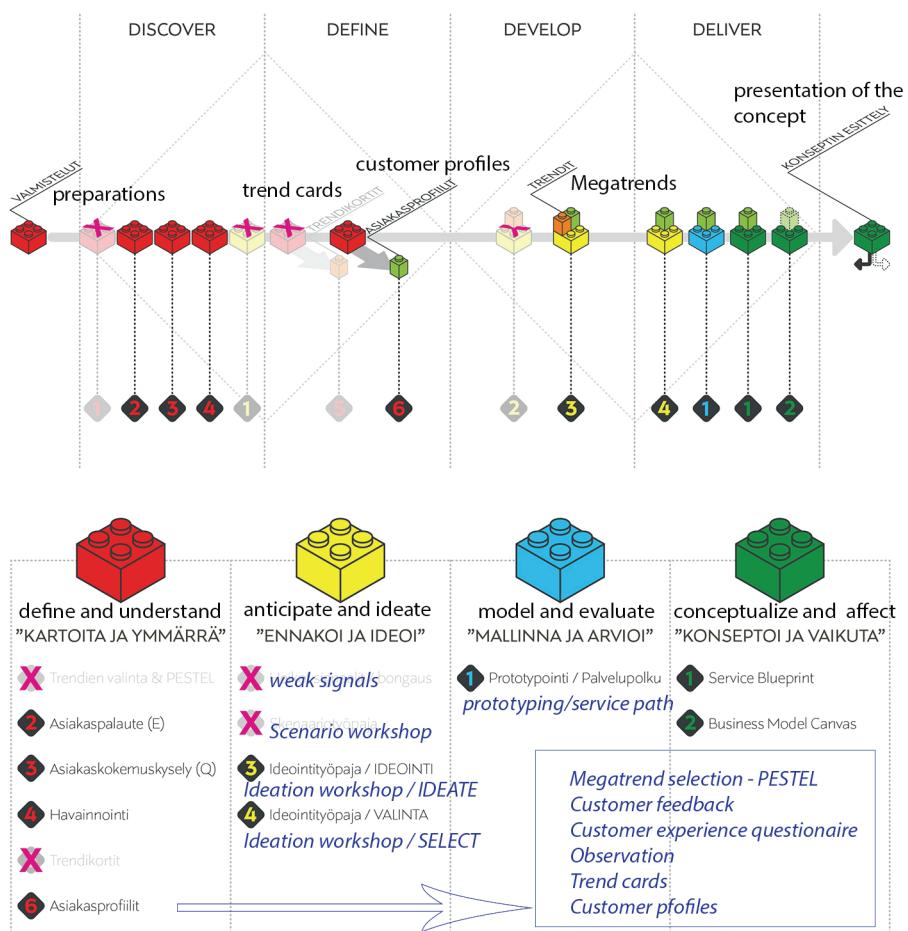


Figure 7. The modified Plan B design process for the co-design in the department store customer guidance concept creation case.

The management-level capabilities in design include skills and understanding for designing the design process for many different purposes. It includes understanding and using skills in evidence-based design research methods and skills in creativity and concept building. Furthermore, the management of design development is about having a good gaming eye for the necessary changes of the design process during the development.

Learning about the sense-making for design processes

The modelling of the design process is a valuable support tool in design education. However, using only the basic and typical models, such as the double diamond or the necktie type of a model, can be misleading. Choosing different methods and visualising helps to understand the variation needs of the process when applied in different contextual cases. Especially in complex problems, there is no one way to move along the process path, and iterations from diverse perspectives are required.

The variations of divergent, generative and convergent, analytic-logical thinking modes set the design process aside from a mere logical, analytic development processes. The special power of design thinking is the generative work that provides for a holistic, multi-perspective insight to the design challenges. This insight is the ground necessary for creative ideas. The multitude of generative material also needs synthesis and concept building combining the analytic logical thinking into the creative results of the process. Thus, design processes need to variate in relation with these modes of divergent, generative and convergent analytic-logical thinking in order to pump the process forward and drive the process to solutions. In addition, there might be a need to repeat the divergent, convergent variation several times over the process. The parts of the possible process as tags or cards help in modelling and building a specific process for a certain purpose, more so than a stable process model.

The basic idea of variation required in applying the design process in case-specific contexts are similar both on BA and MA levels. One big difference comes from the brief setting, which can be ready given in the case for BA level studies and more to be created by the students themselves on the managerial MA level. On the BA level the aim is to learn about the basic design process for operational purposes of getting things designed well. On the MA level the front-end challenges and research of what things should be designed and how the design processes should be managed come to play a major role.

The more complex society and thus challenges get, the more flexible the design process needs to be. This also means the more necessary it is to draft and visualise the process with tools you can use to build and re-build the process again and again. The pre-design of the design process must be flexible, and a Plan B should be available or made up when necessary. The power of design is in creativity and adaptability to contextual circumstances, and this is what should be embedded in design education of the process itself.

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Teaching design to management students. Challenges and risks toward a new integrative pedagogy.

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Abstract

The impact that design is having on managerial culture and practice is progressively influencing the pedagogy and the learning path related to engineering courses. After the era of the "Project-Based Learning" paradigm (PBL) the attention of teachers and scholars is nowadays shifting on Strategic Design and Design Thinking pedagogy. How the basic principles of Design Thinking can be transferred in those educational contexts where an increasing interdependence between design and management is occurring? What are the main learning takes away that management engineering students are more able to absorb and what the difficulties to face in a strategic design studio? What "design tools" mainly enhance creative leaps in a project? To address that questions an exploratory inquiry on 54 students involved in a Strategic Design course placed in a Management Engineering Master Degree has been run. Results derived through the use of descriptive statistics show that management engineering students from a Strategic Design studio mainly grasp – as major takes away - the framing/reframing logics, the visual thinking abilities and the knowledge to explore user experience and context. Moreover framing/reframing the design problem represents even the most difficult capability to learn jointly with the visual representation of business idea and the impulse to propose new solutions. Finally – according to the results - students consider developmental tools as customer journey, service blueprint and offering map – placed in the middle-final part of the creative process - more oriented to create creative leaps and to search for alternative solutions.

Author keywords

PBL; Design teaching; Design Thinking; Strategic design studio

Introduction

In the field of engineering education different changes and landslides occurred.

After stressing analytical capabilities to tackle with complex problems according to deterministic and sophisticated analysis project management and design related logics have been introduced. The more the innovation pervades engineering and management studies the more analytical skills – oriented to create deepened *status-quo* pictures – risk to be a limited asset. Engineering project and project management need holistic thinking, proposition capabilities, abilities to come outside the project field in order to grasp possible stimuli and insights.

A vast literature saw in Project-Based Learning (PBL) a first source to enrich engineering culture (Blumenfeld et al., 1991; Thomas, 2000; Stepien and Gallagher, 1993). Be trained in a project environment means to set goals, to decide the path, to accept risk and serendipity, to embrace complexity and ambiguity, to play with non-school like situations that can be prototyped and tested in real setting. This literature – mainly placed in 80ies and 90ies – was specifically oriented to the “hard engineering” domains – as mechanics, chemistry, ICT – in order to improve the proposition capabilities and the project management abilities.

Nowadays the success of new engineering fields – not typically linked to the “hard sciences” – as management engineering and the emergence of new paradigms of teaching derived by the design culture – as Design Thinking for instance - are posing new challenges and questions about new forms of pedagogies in design (Glen et al., 2015).

Specifically teaching design in management engineering or wider managerial contexts, cannot replicate the same assumptions and logics of PBL for different reasons and emerging factors.

First, management and design both share a typical attention to the final user. Through marketing from one side, through the Human-Centred approach by the other, they both share a common point of view in identifying the final receiver of the solution to a specific problem (Veryzer and Borja de Mozota, 2005).

Moreover, management studies are abandoning the old managerial patterns and certainties (...) in favour of a less paradigmatic view that deals with ambiguous problems, with the stating of hypothesis about what user consider or not value, with principles such as learning from failure, or testing assumptions and business hypothesis through “minimum viable products” (Ries, 2011).

This field that comes under the hat of entrepreneurship – if related to the creation of new ventures – or under the hat of intrapreneurship – if linked to the creation of spin-off and new business in incumbent companies - is approaching managerial culture to design domain.

Finally Design Thinking is a new paradigm that embeds new principles and practice to drive innovation in product-service, but even in organizational behaviours and people mindset (Cross, 2011; Elsbach and Stigliani, 2018).

So, which kind of design pedagogy principles can serve the learning of management engineering students? What are the main learning points and difficulties that management engineering students face in experiencing a strategic design course? Which design skills they consider as complementary to the ones they already handle? And finally, which tools they consider as more fertile to provide creative insights?

To address that questions – in order to lay the foundations of a new design pedagogy specifically oriented to management students – an exploratory on field research has been run. Foundational questions about the learning take away, the main difficulties faced, the complementary skills and the logics to employ design tools have been submitted to 54 students in a Strategic Design studio placed within the Management Engineering Master Degree at Politecnico di Milano.

Descriptive statistics have been used to generate results and discuss insights.

Findings show what are the main learning points, the difficulties faced and the tools that enabled creative leaps in the project.

The article is divided into five main parts. Following, the theoretical background expresses how the consolidated PBL paradigm needs a refresh in light of the emerging factors that relate with the strict occurring integration between design and managerial culture. The methodology follows, expressing how the research design has been conceived. Later, results analysis shows the areas of inquiry and the main derived data. A discussion follows where the traits of the foundation of new pedagogy for design for management are depicted. Conclusion at the end shows the main remarks for future avenues in research about design teaching and the article limits.

Theoretical background

Literature about Project Based Learning (PBL) has been consolidated clarifying the teaching strategy and the main learning logics. Specifically, PBL is considered a comprehensive approach to classroom teaching and learning that is conceived to engage students in investigation of authentic and novel problems (Blumenfeld et al., 1991; Barron et al., 1998). In PBL, the project is the central teaching strategy where students encounter and learn the central concepts of the discipline via the project (Thomas, 2000). The definition of the project (for students) must "be crafted in order to make a connection between activities and the underlying conceptual knowledge that one might hope to foster" (Blumenfeld et al., 1991). This is usually done with a "driving question" or an ill-defined problem (Stepien and Gallagher, 1993). Projects indeed involve students in a constructive investigation process, where this is considered as a goal directed process that involves inquiry, knowledge building, and resolution. Investigations include design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. But, in order to be considered as a PBL activity, the central activities of the project must involve the transformation and construction of knowledge. The main literature considers projects as student-driven to some significant degree, where students challenge concepts as autonomy, choice, unsupervised work time, and responsibility. In order to improve the knowledge acquisition, literature states that projects have to be realistic, not school-like, embodying characteristics that give them a

feeling of authenticity. On the other hand, literature highlighted other learning impacting factors that include the topic, the given tasks, the roles that students play, the context within which they work, the collaborators who work with students on the project, the products that are produced, the audience for the project's products, or the criteria by which the products or performances are judged. Finally factors that affect motivation have been widely investigated: the interest and value students attribute to the problem and elements in projects; tasks should be varied and include novel elements, the problem has to be authentic and challenging, moreover projects need a closure sense, so that concepts should be materialized in form of artifacts (Malone & Lepper, 2005). Looking at the academic journal nature – as *Journal of Engineering Education*, *Higher Education Research and Development*, *Australasian Journal of Engineering* – that dedicated much emphasis to PBL and to the key reported messages, PBL literature seems to mainly address engineering students and the engineering schools educational needs mainly related to the "hard engineering sciences" such as civil, mechanical, chemistry, ICT. After years of engineering teaching mainly centered on developing analytical skills and problem solving mostly related to clear cut domains, some scholars pinpointed a relative failure of such capabilities in facing ambiguous problems, or in exiting from Euclidean rationale in approaching holistic problems (Dym, Clive L., et al., 2005).

Specifically, the main rationale of the introduction of PBL in hard engineering courses consisted in instilling proposition and design capabilities in students whose habits in learning related with analytical problem, given clear constraints, orientation to reach unique solution even for wide scale problems.

Nevertheless, while the main academic contributions about PBL dated 80ies and 90ies, recently design teaching is attracting scholars and expert attention, partially integrating, strengthening or replacing PBL pedagogies (Dym, Clive L., et al., 2005). Specifically, Design Thinking – in academic research debate as in teaching – is becoming a paradigmatic approach oriented to pursue innovation combining creative abilities with intuitive ones, deepening the empathy with the user, enabling discussion and consensus through visual thinking, replacing deduction and inductive reasoning with abduction, leveraging specifically "how might be" questions and "what-if" (Martin, 2009; Brown, 2008; Liedtka, 2011; Liedtka and Ogilvie, 2011).

After the fertile experience at Stanford – with the D.School – where students enrolled in all the degrees and Masters can be engaged in single or bundled courses to increase their "designerly way of knowing" (Cross, 2001; 2006), different highly ranked Management Schools (as INSEAD, MIP-Politecnico di Milano, Antwerp, Saint Gallen, Harvard Business School) are integrating in MBAs programs design related entire streams, labs or single courses. In a recent theoretical work, Glen et al. (2015) - investigating Design Thinking teaching in business schools - reflect the more general movement in education away from an over-dependence on passive teaching approaches, towards more active problem-based learning. These authors reinforce the benefits of Design Thinking teaching for management students pinpointing how it fosters the ability to work through the innovation process, the ability to work with multidimensional contexts and solutions associated with active engagement in real-world situations, the learning through using specific tools, the development of interpersonal skills relating to team working. If the integration of design related contents through design teaching techniques and pedagogies is assumed to

enrich and strengthen the cultural background and the soft skills of management students, there continue to be a poor understanding about the main "take away" and the difficulties students face, joint to the benefits and the limits that the "tools based learning" embedded in DT pedagogy, presents.

Therefore, given a lack of evidence in last contributions about design teaching in non-design educational contexts, the article aims to fill that gap running a quantitative on-field analysis.

Methodology

This paper is based on the results of a survey conducted on students enrolled in Management Engineering Master Degree at Politecnico di Milano, specifically related to "Design management, entrepreneurship and innovation" stream. In particular, the empirical study was conducted during the 15 ECTS credits course "Design Management Lab" that represents the final studio. The course' challenge consists to develop an innovative project, with a brief provided by a company, using both managerial and design theories and tools oriented to create novel solution of product-service. The brief in this course is provided by NTT Data that asked students to find novel applications through design about a new sensoring technology.

The Design Management Lab taken in this study is a journey aimed at developing capabilities and skills to handle design-driven innovation, to manage design-related tradeoffs, to mold scenarios of innovation and configure new product-service systems and business models, focusing in particular on three main learning outcomes:

- trends and scenario board: where students are evaluated for their capability to identify technology, social and cultural changing factors that affect the framing, the completion and the reframing of the strategic brief;
- user analysis board: where students are evaluated for the depth of articulating user needs/characteristics/attitudes and the capability to represent and visualize "personas" according to concise and appealing frames;
- new business ideas development: where students are assessed on their capability to identify promising business lines and embedding that ideas in compelling storytelling.

The learning outcomes are reached through lectures on themes from both Managerial and Design fields, presentations and explanations of the most important design tools needed to address the course and a project conducted in teams, where students have to properly manage the previous presented contents.

A questionnaire characterized by 4 main areas of inquiry has been submitted at the end of the entire course to 54 students composed by 32 males and 22 females.

Given the aim of the study the investigated areas were:

- primary learning take-away of the students;
- complementary skills to management engineering background of the students;
- the level of difficulties associated to the different phases of the project development;
- the contribution of the design tools adopted in generating creative leaps and overcoming creativity blocks.

Each question was provided with multiple fixed choices, ranging from 3 to 10 possible answers depending on the investigated area.

All the answers were collected in a .xls file in order to create descriptive statistics graph for each area of inquiry (Hays, 1973).

All the results were collected through histograms and were discussed by a team of two researchers and two Professors. After a first-hand discussion the research team invited two external researchers in order to freeze insights and provide further comments to the statistics results.

Results analysis

The analysis has been developed submitting a multiple choices questionnaire to the described sample of students. The approach used for posing and than scaling the responses is the *likert scale* approach; the scale is articulated in a range from 1 to 5 as parameters of evaluation, where the lowest represents the poor presence of the investigated aspect and the highest stands for the high presence of it. For each area of inquiry analysed through one dedicated question, only the results of those answers/graphs which present a valuable variance from most significant values (4-5) and lowest ones are commented. The full script of the questionnaire is attached in Annex to this paper.

Regarding the first area of inquiry, that relates with the main “learning takeaway” the 63% (34) of students highly evaluate the aspect of *deepening what user experiences in real context* (figure 1). Therefore, the 64% (35) of students assess positively the process of *reframing the problem by searching for an alternative view*. Moreover, one of the crucial take away consists in *visual representing and communicating new ideas* highly evaluated from the 76% (41) of students (figure 1).

In reflecting on the end of the course, what are your primary learning “take aways” from the DML experience:

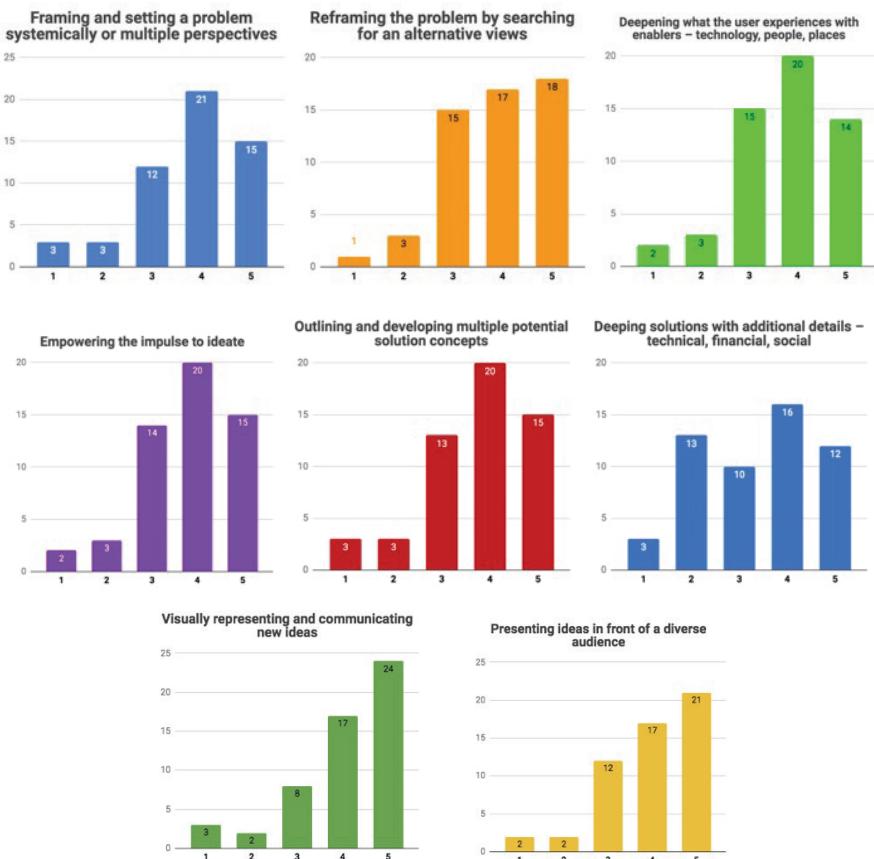


Figure 1. Primary learning takeaway during the course.

Concerning the second area of inquiry, that relates with the “skills considered as complementary to the management engineering background” as happened in the first area of inquiry, the 76% (41) of the sample highly evaluates the process of *reframing the problem by searching for an alternative view*. It means they consider one of the main pillars of Design Thinking (Dorst, 2011) as one of the complementary add on their management background. The 72% (39) of the sample of students, instead, highly assess the skill of *visually representing and communicating new ideas* (figure 2). In addition, one of the crucial skills seem to consist in *empowering the impulse to ideate* highly evaluated as crucial by the 72% (39) of the sample of students (figure 2).

Which of the following skills do you now consider as “complementary” to your management engineering background:

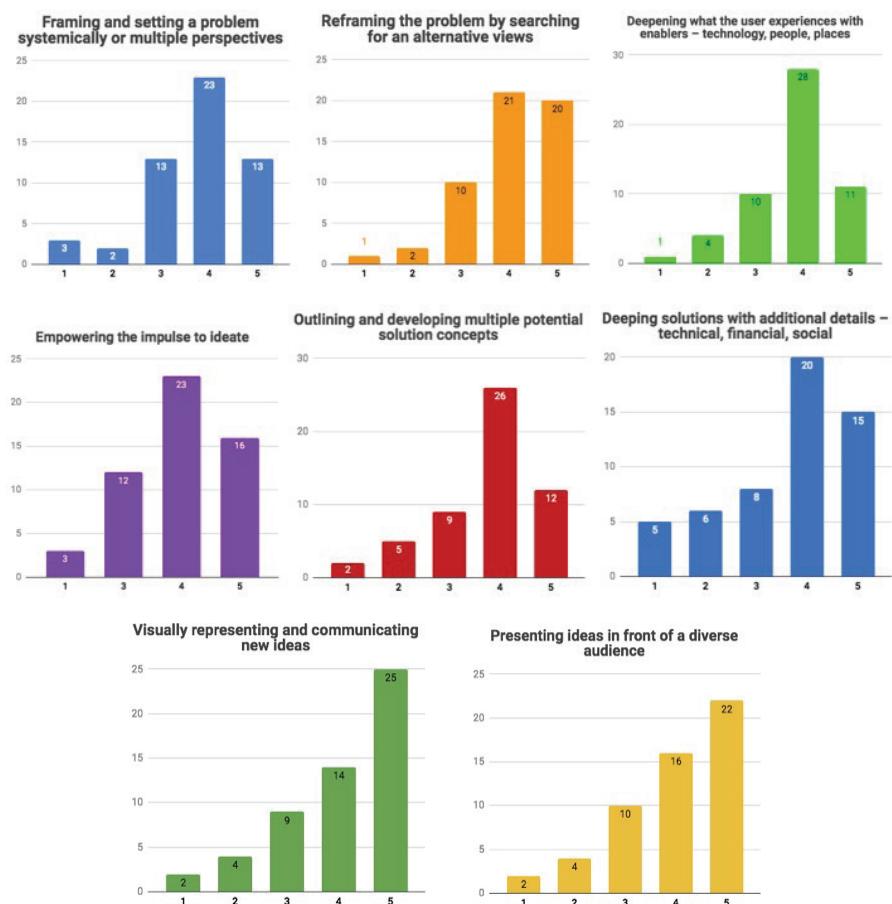


Figure 2. Complementary skills to management engineering background

About the third area of inquiry that analyses the “grade of difficulties associated to the single phase of the project development”, 74% (40) of students perceived as very critical the *framing and reframing* phase; only the 33% (18) of the sample evaluate as critical the *scenario and use case development phase*. The *strategic design* is perceived as critical from the 53% (29) of students (figure 3).

Try to identify the difficulties grade associated to the single phase of the project development
(1= VERY EASY; 5 =VERY CRITICAL)

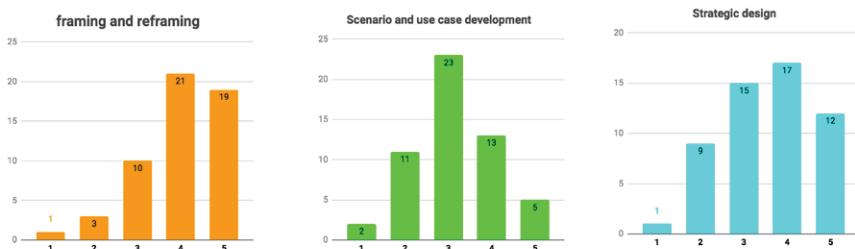


Figure 3. Grade of difficulties of the different phases of course and design process

Regarding the fourth and last area of inquiry, that relates with “how much each of the adopted design tools contributed to generating creative leaps and overcoming creativity blocks” a high percentage of students highly evaluate those design tools adopted for developing the solutions: *scenario building* (67% -36), *customer journey* (70% -38), *offering map* (80% -43), and *service blueprint* (63% -34).

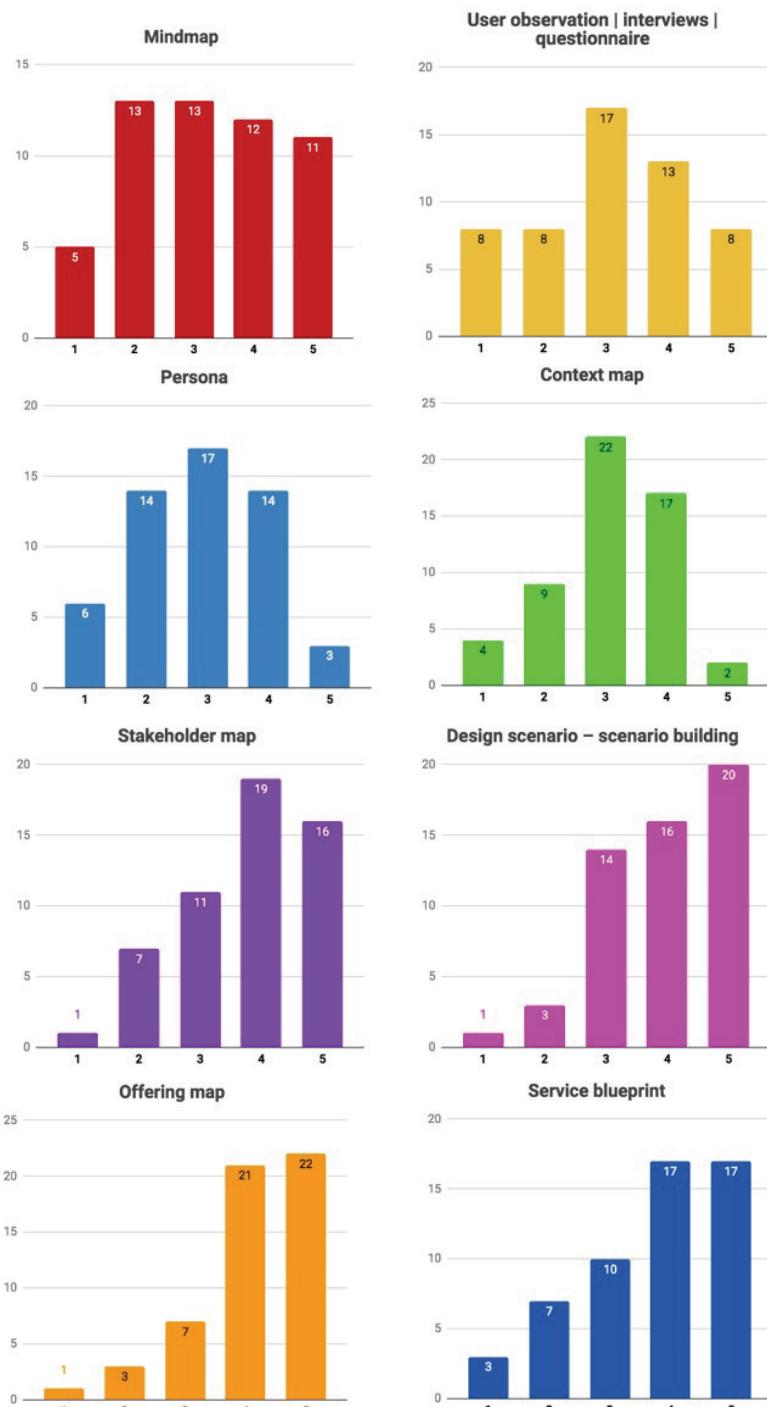


Figure 4. Grade that the adopted design tools contributed to generating creative leaps and overcoming creativity blocks

Discussion

The results analysis tends to partially confirm established acquisitions that the main design teaching literature stated; on the other hand, new insights about teaching design in non-design students can be derived.

First, the inquiry about the main “learning takes away” tends to pinpoint what non-design students –specifically management engineering students – tend to appreciate by design culture and Design Thinking.

The highest acquisition is about visual representation. This acquisition seems to be in line with all the literature from the outside of design domain that sees in design a way of visual thinking that enables strategic reflexions and the searching for a common view (Gorb, 1990; Osterwalder and Pigneur, 2010).

Moreover, the other highly appreciated learning point that leverages “reframing the problem by searching for alternative view” tend to suggest that management engineering students – used to face management problems with data analytics and deepening – saw in design culture a way to treat design problem area with other lens. More than going in depth, design is confirmed to be appreciated for the principles to tackle the problem from other angles, to add alternative perspectives, to play with metaphors in order to loosen the strong constraints of the problem and suggest possible weak links that could be promising (Dorst, 2011).

The other learning area – relating to the user experience – reveals instead a specific aspect related to design teaching that enriches some specific knowledge that management engineering student usually handle. Specifically marketing teaching is used to transfer some constructs and models about user analysis. Actually, design adds to a systematic view of the user gained through marketing management peculiar aspects related to the user that deal with the user behaviour, with the use contexts and with some soft aspects that relate with the user lifestyles. Even here some graphic user representations embedded in mood board expressing the user lifestyle, the objects that surrounds her life, the storytelling through “personas”, intended as a visual portrait that holds the personal life and the personal belongings in a canvas – provide the soft side of the user analytics that marketing for a long time neglected (Carson, 2001).

The second inquiry area deals with the skills that students considered as complementary to their “native” background centred on managerial sciences. Here if reframing abilities and the visual representation are confirmed to be additive and complementary to their previous knowledge ground, a focal attention stems from “*the impulse to ideate*” that they highlight as a complementary. This finding shows how management engineering domain – without design courses – risks to create future managers with strong capabilities to create meaningful analytical frames but characterized by poor proposition capabilities. In other words, management engineering students are able to create a full picture – made by data and insights - of an innovation or strategic problem – the problem space area (Dorst and Cross, 2011) - but they seem to be stuck when they should propose exit avenues by the problem-space depicting some promising solutions – the solution space area (Dorst and Cross, 2001) to say.

In this sense visual representation and visual thinking act as a crucial support in the process of decision making: the capability of visualize data and knolwdge in different phases of the project has been adopted by management engineering students to depict solutions in form of visual synthesis derived by the complex process of analysis. Thus, visual thinking stands as a link between the problem space area and the solution space one (Dorst and Cross, 2011).

Here, going beyond the finding itself, it seems that the integration of design in management background acts as a sort of cure for the “paralysis by analysis” paradox that usually managers experience in facing problems that provide the creation of novel goods or processes (Langley, 1995).

By the third area of inquiry – instead – it results that the framing and reframing phase have been “suffered” as the most critical phase. This finding does not seem to be counterintuitive. As anticipated management engineering background tends to split a problem in sub-areas and to accommodate a possible solution for each problematic sub-area. This is quite opposite to what happen in design thinking and culture where the problem is seen in its ambiguity, working on the border, emphasising the holistic soul of it. Moreover, reframing an innovation problem means even in certain moments to provide weak interpretation or suggesting with the alternative perspective of the problem itself possible avenues to solution. As recommended in literature there are overlapping areas and moments between the problem-space and the solution-space (Dorst and Cross, 2011). On the other hand, there’s something to say about managerial culture that is going completely in the direction of Design Thinking. The advent and the raising attention in the entrepreneurship are contributing to approaching progressively managerial culture to design thinking. As in Design Thinking, as matter of fact, even entrepreneurship follows some abductive reasoning, develops propositions in terms of “what-if”, tends to reframe the problems fixing some assumptions and advancing operative hypothesis to test, until leveraging on the building of Minimum Viable Products that mimic the prototyping rules very common in design domain (Ries, 2011). This enrichment of the managerial culture made by the entrepreneurship domain- in other words – tends to approach further management to design. After all, a common ground that pertains the relationship between Design Thinking and lean entrepreneurship is growing faster (Nielsen and Stovang, 2015).

Lastly the findings related to the contribution of design tools to creative leaps tend to suggest some novel insights respect to the consolidated literature.

Design Thinking is taught through the employment of tools of different nature: tools to instil creativity, representation tools, development tools, (Stickdorn et al. 2010). It’s quite surprising that according to the findings shown above the tools acknowledged as more effective for generating creative leaps have been tools placed in the late developmental phase and not in the framing/reframing phase, at the beginning of the entire creative process.

Some hints can be advanced. First, iterative logics of Design Thinking imposes to search creative leaps not just at the beginning, but since the beginning to the end and vice versa, in a recursive loop. It means that they fully absorbed the

iteration logics to arrive at the end of the process to question and reconsider the first assumptions.

Moreover – even accepting the fact that the major concentration of design tools lies in the solutioning part of the DT process and not in the “problem context” arena – design teaching could reconsider the use of tools loosening some taxonomies and some phase allocation that tend to inhibit the real potentialities. In other words, the same design tools can be employed according to different ends. Leaving apart the scenario building map where the aim to represent future course of action is almost fixed, tools as a customer journey or a service blueprint can be leveraged to represent “as is” situation searching for insights or to represent a “to be” situation. The conducted study strengthens the point that design tools can be versatile and that its use can be suggested by the contingencies and by the on-going evaluation. After a first round where a not satisfactory creative result has been reached, making iteration does not mean to repeat everything again – one more time – but contrarily to change the way tools are used and insights generated.

This is coupled even with an additional aspect: when a new experience or a new product-service is represented in detail insights about new changes – that can be incremental or even radical – emerge. Developmental tools – pinpointing detailed aspects – can generate doubts, questions and cues useful even for restarting a reframing phase. Moreover, the results suggest that fundamentally the creative leaps can be generated seeing at the user experience and/or to the structure of the offering (in form of bundle structure or process).

Conclusion

The article tries to increase the understanding of design teaching in educational environment far – until few years ago – respect to the design culture.

Design teaching is changing overall for different reasons. The old paradigm of PBL is being enriched by different factors that affects both engineering and design education. The raising attention for Design Thinking by engineering and managerial sides is creating novel conditions and pedagogies in design. Design is not anymore, a sort of foreign body respect to the field of engineering and management. Far to be recognized as a limited territory where to learn product semiotics and aesthetics, design is nowadays being acknowledged as a pillar in the theory of innovation able to influence managerial and engineering decision making, the organization culture and behaviour, the people mind-set (Elsbach and Stigliani, 2018; Cross, 2011; Kelley and Kelley, 2013). With the diffusion of design courses and streams in Business Schools and Management studies, design itself seems to change its own original skin. The integration between technological issues – driven by the digital transformation – with the boosting of entrepreneurial issues in management agenda imposes new forms and new lens to teach design in non-design contexts, with an integrative pedagogy model.

The classical scope of design related to objects shifted to service, organizational process, business model (Osterwalder and Pigneur, 2010). The more design enters the classical managerial scopes, the more design is influenced by

constructs and principles related to organizational frame. On the other hand, management teaching is absorbing many logics from design teaching changing the classical pedagogical pillar. The introduction of Lab and Workshop, the inclusion of prototyping and testing logics, the adoption of problem reframing exercise represents the text of an integrated territory where it will be quite difficult – in the short run – distinguishing design from management pedagogy.

Given this increasing integration, next steps in research should explore not the integration happened between two domains, but a new integrative pedagogy and teaching ground made by novel derived principles and practices.

The learning points, the difficulties that management engineering students face to learn design thinking and the complementary skills leveraged to learn design thinking shown in the present article open new insights to explore a hybrid territory that is owned neither by design neither by management.

Lastly, the article is not immune by limits. Some highlighted results can be biased by the kind of design challenge, by the structure of the course, by the tutor mind-sets and teaching abilities. Additional question in future researches could mitigate those biases naturally connected to on field researches in teaching scope.

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ANNEX – Full questionnaire – Questions and answers

Teaching strategic design to management engineering students

This questionnaire aims to better understand how the DML course improved your knowledge and increased your skills through the learning project HITOE. Feel free to answer to the questions below with the maximum sincerity and fairness. Answers are reported with multiple choices.

The data we are collecting will be probably used only for scientific purposes, such as writing academic reports or articles on journals. Thank you in advance for your participation.

1) In reflecting on the end of the course, what are your primary learning “take aways” from the DML experience:

Evaluate from 1 to 5 (1= very low; 5 =very high) each of the indicator related to your didactic experience.

- framing and setting a problem systemically or multiple perspectives
- reframing the problem by searching for an alternative views
- deepening what the user experiences with enablers – technology, people, places,
- empowering the impulse to ideate
- outlining and developing multiple potential solution concepts
- deeping solutions with additional details – technical, financial, social,
- visually representing and communicating new ideas
- presenting ideas in front of a diverse audience

2) Which of the following skills do you now consider as “complementary” to your management engineering background:

Evaluate from 1 to 5 (1= very low; 5 =very high) each of the indicator related to your didactic experience.

- framing and setting a problem systemically or multiple perspectives
- reframing the problem by searching for an alternative views
- deepening what the user experiences with enablers – technology, people, places,
- empowering the impulse to ideate
- outlining and developing multiple potential solution concepts
- deeping solutions with additional details – technical, financial, social,
- visually representing and communicating new ideas

- presenting ideas in front of a diverse audience

3) Try to identify the difficulties grade associated to the single phase of the project development

Evaluate from 1 to 5 (1= VERY EASY; 5 =VERY CRITICAL) each of the indicator related to your didactic experience.

- framing and reframing
- scenario and use case development
- strategic design

4) Please identify how much each of the following design tools contributed to generating creative leaps and overcoming creativity blocks.

Evaluate from 1 to 5 (1= almost useless; 5 =useful and effective) each of the indicator related to your didactic experience.

- Mindmap
- User observation | interviews |questionnaire
- Persona
- Context map
- Stakeholder map
- Design scenario – scenario building
- Offering map
- Service blueprint

Professional Papers

The Future of Design Education: Computational Thinking vs Design Thinking

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Abstract

Design is the most ubiquitous of all the art forms. Graphic design can be found everywhere and anywhere from our hand-held devices to public displays. It communicates vital messages to our daily lives through website, mobile devices, posters, books etc. With the rise of the internet and a multitude of other networking technologies, interaction design has become arguably the most vital design discipline. Furthermore, evolving technologies have revolutionized the role of designers by encouraging design to be more diverse, inter-disciplinary, and interactive than ever before. Specifically, through the interplay of complex information between design and computer programming, new and fascinating visual worlds are constantly emerging. We can't create competent design without knowing what is going on behind the screen and without knowing any design knowledge, there is no need to code. As educators this reality begs the question: Are we as design educators doing all that we can to effectively prepare our students for the challenge of bridging the gap between design and computer programming to meet the needs of current design industry?

Anecdotally, educators often discuss the importance of effectively teaching both right brain and left-brain concepts. In other words, we aspire to enhance our students' left-brain skills such as logical thinking, scientific analysis, measurement accuracy while we also seek to bolster students' right-brain

skills such as creative writing, attention to aesthetics, empathy, and unique expression. [1] Through my own teaching and research experiences, I have found that more often than not, design solutions either rely on aesthetic and user-research focused right brain skills or computer programming and business focused left brain skills. Due to this, it is difficult to find students, especially those transitioning into the workforce, that have the skillset to incorporate both highly competent programming and business, and user-focused design skills. Thus, for the current design education to improve and thrive, it is vital that we as educators enhance both left brain skills (computer programming and business) and right brain skills (user-research and design).

Given the current state of design education, this presentation will discuss on how computer programming has been affecting design education; why it is so important to learn computer programming and business as designers; how we as educators should prepare our students for current industrial demands; and how it will change the way we experience design in the future.

Author keywords

Design Thinking; Computational Thinking; Right Brain; Left Brain; Future of Design Education.

Introduction

As a Graphic Design instructor, I have taught traditional print Graphic Design as well as contemporary screen based Graphic Design. During the most recent years, the focus of my teaching centers around screen-based Interactive Design. Such course content includes Web Design/Development, Mobile app design, Creative Programming and Data Visualization. All those classes require the mixture of left-brain skills (computer programming and business) and right-brain skills (user-research and aesthetic design). More often than not, crossing the technical boundary is often challenging for even the most advanced students. However, for current design education to improve and thrive, it is vital that we as educators enhance both left brain skills and right brain skills and get them to work together.

As a Graphic Design instructor in an ever-evolving field, we should look close to **1) Design & Current Industry** (business); Is it important and/or necessary for designers to engage with the business? **2) Design Team**; How are design teams evolving? What are best practices for collaboration with product and engineering? **3) Designers in the Future**; What are the key emerging skills and trends for designers gaining competency at emerging tech? and How do we as design educators prepare our students?

Note: To give you the context, I teach at School of Art and Design at Texas State University, San Marcos, Texas, United States. There are about 1000 students within the School of Art and Design and about 400 students are

design majors. For the entire University, about 45% of the students are white, about 37% of the students are Hispanics, about 12% of the students are African-American. For gender, about 58% of the students are female, about 42% of the students are male. [2]

Design and Industry

Is it important and/or necessary for designers to engage with the current industry?

Tim Riley, Senior Director of Digital Experience at Warby Parker said that “Ultimately everything a design team does has consequences (both good and bad) for a business. The more you know about the business and its goals and intentions, the better a design team is positioned to deliver good experiences and results for the business.” [3] That means when a particular design solution is developed, it should be framed around how it will impact the business that includes improving user experience, sharpening the brand identity and connecting with the audience. It is inevitable for designers to have a relationship with the business to understand how to create an impactful solution.

In the 2017 report from the NEA (New Enterprise Association) Future of Design, [4] emerging technology companies believe that design moves the needle in sales, customer engagement, customer retention, brand awareness, and higher company valuation. Though the measurement of design impact is somewhat indefinite, the success of products is often measured by success of design.

The user-centered design is the main research agenda on every digital product such as Web and Mobile Applications. By understanding and establishing empathy with the user, designers are able to work toward outcomes that meet their needs more successfully. We are in a time where design is measured by how well it fulfills our users' need. When we shift the conversation from one about features and functions to one about users and user outcomes, we deliver more useful, usable, and desirable solutions. In order for design education to thrive it is crucial to embed curriculum with a holistic view on how to design the entire user experience for digital products.

In order to create Web and Mobile applications, design should have a clear and explicit focus on the potential users who use a product or service. Research methodology involves setting a goal, defining users and the user map flow to understand the users' needs, hopes, challenges and wants. *The Design Sprint* process from Google and *The Design Thinking Field Guide* from IBM are introduced in my classroom for user research methodology. *The Design Sprint* was developed by Google and it is a five-day process for answering critical business questions through design, prototyping, and testing ideas with customers. [5] I use the *Design Sprint* as a guideline to conduct user-research in two classroom periods (6 hours total). The first day largely consists of setting a goal, make a user-flow map, develop “How Might We” questions –

questions aimed to provoke meaningful and relevant ideas, and identify the crucial moment on the user-flow map. The second day largely consists of looking at great solutions from real world companies, sketch design concepts and discuss their feasibility, storyboard to plan a prototype, develop a quick prototype and lastly User-Test. It is important for the instructor to keep students on task and moving quickly through the steps. These two days will yield low fidelity prototypes that can be expanded upon during future class sessions. The other design research methodology I use in the classroom is adapted from *Design Thinking Field Guide* developed by the IBM Design Research team. It is another way for teams to deliver services and products that empower better human outcomes and client success. Its framework is centered on how designers should understand the users through a series of practices. When utilizing this technique I spend two class periods (6 hours total) to conduct user-research, develop a Stakeholder Map, Empathy Map, Scenario Map, Needs Statement, Storyboard, and an Experience-Based Roadmap. [6]

Through the two iterative user-research methodologies, students get to understand user behaviors, needs, and motivations and are able to identify a problem space for which solutions are proposed. Additionally, user research helps creating products that are truly relevant to the target group and ensure the products deliver a great user experience.

Design Team Growth

How are design teams evolving? What are best practices for collaboration with designers, engineers and businessmen?

In the 2017 report from the NEA Future of Design, the report indicates that the most essential designers in the current design industry are product designers, UX Designers, UI/Visual Designers, Marketing/Brand Designers, and Front-End Developers. [3] Interestingly, writing is also now considered as a key design team skill. Strong writers are critical for building an online presence - including social media- as written content plays an increasingly large role for the overall business brand.

Then what do product designers do?

Product design is the practice of designing the entire user experience for digital software. Product design defines how the outcome works and how it feels, delivers a constantly evolving, improving experience for the users supported by user research, analytics and product strategy. Product design also includes 1) concept articulation for the business 2) low-fidelity prototyping for user research and 3) high-fidelity design for engineering. Overall, product design is the act of creating solutions to user problems in digital products.

Then what are best practices for design and digital products?

1. Be clear on accountability: Product is accountable for business needs and design is responsible for user needs and overall experience.

2. Prototype early and often.
3. Narrow the gap between design and development, which products can help facilitate. Start collaboration as early as possible.

In order to create a successful digital product, designers have to work with product partners to align on the problems. Design is a peer organization to Product Management and Engineering. Ideally, one representative from each group makes up the triad responsible for the road-mapping design process.

Then what are best practices for designers, product managers, and engineers?

1. Document all decisions.
2. Sit together and listen to each other's perspective.
3. Bring engineers in early.
4. Know some coding to understand the technical constraints and be able to speak the engineer's language.
5. Choose a collaboration tool such as Adobe XD, InVision, Sketch, Principle etc.
6. Building cross-functional (one representative from each group) teams are the most successful.

When and why does design fail?

1. Design doesn't communicate its value in terms of business goals. This is why setting a clear goal in the early stages is crucial.
2. Lack of successful user research and communication barriers within the organization.
3. When steps in the process are skipped or overworked. When people spin their wheels without getting feedback and/or collaboration from others.
4. When there isn't research or data to back up ideas/decisions.
If design or designers don't have the holistic context for a problem, design in isolation, or are only focused on solving for a user challenge but not addressing the business need.

Importance of Diversity in Design

In order to build a team capable of solving user problems the collection of product designers and engineers must be diverse. Diversity means building a team with a variety of perspectives that are shaped by gender, race, ethnicity, religion and culture. Diversity is essential for bringing unique perspectives to a subject matter because design solutions often call for deeply personal experiences. Often these experiences stem from what is learned at home and through our culture. There is a direct connection between a diverse design team and the product's ability to relate to broad audiences.

Once Steve Jobs, Co-Founder of Apple said that "A lot of people in our industry haven't had very diverse experiences. So they don't have enough dots to connect, and they end up with very linear solutions without a broad perspective on the problem. The broader one's understanding of the human experience, the better design we will have." [7]

Designers in the Future

Designer skills of the near future include combining greater management and business acumen with clearer communication and people-based soft-skills such as leadership skills, teamwork, communication skills, flexibility, interpersonal skills, writing, presenting, ability to collaborate, and empathy.

Additional technical skills will also be needed—competency in working with new emerging technologies like AI (Artificial Intelligence), ML (Machine Learning), and voice recognition. Tomorrows designers will also likely benefit by being knowledgeable in conversation design, data science, sound design, scenario design and behavioral psychology. Many of these areas are not traditionally touched by designers, but are rapidly trending to becoming essential elements in the designer’s role.

Conclusion

The field of design is rapidly expanding. Working in conjunction with emerging technology such as AI, ML and voice, designers will be called upon to collect a broader set of inputs (such as utilizing data to design scenarios) and outputs (such as script writing and sound design). The discipline of Design will continue to grow closer to digital products. Furthermore, product design will continue to be refined in its definition and role within a company in relation to traditional product management and engineering.

Design has moved the needle for us in two ways. First, in the user-centered design of our physical products. It's the crucial aspect of any company that is built to last. Second, the design of every brand experience from subway ads, to email campaigns, to pop-up experiences has driven awareness to a topic that people wouldn't normally care about. The design brings joy and fun into everyday experience.

I strongly believe that there should be more interaction with outside-of-design disciplines such as business, computer science, computer engineering to name a few. Holistic design approaches from an ‘outside-in’ instead of ‘inside-out’ perspectives are necessary in order to see the entire user system. It is these perspectives that must be engaged with in both the near and far future if we are to successfully push design education forward.

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6. The Future of Design Teaching II

Academic Papers

Match Studio together in the wild: From dialectic contestation to dialogic collaboration

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Abstract

Collaborations between practitioners from different disciplines are increasingly called for in addressing grand societal challenges. However, this way of working is difficult, and uncovers incongruities in the social and cultural practices associated with the traditional notion of disciplines. Terms such as multi-, cross-, inter- and trans-disciplinary have taken hold in research, teaching and learning but these terms are often misunderstood or incorrectly used interchangeably (Stember, 1991). Within the academy, there is also much debate about the demise of disciplinary knowledge and an emerging belief that discipline specificity is no longer a useful epistemological container. Acknowledging that this is the paradigm in which universities must act, this paper presents the founding principles and philosophy of the Match Studio initiative at the University of South Australia (UniSA). The paper presents emergent thinking around models to effectively visualize the role of facilitation in multifaceted research collectives as a means of understanding and generating discourse around these multidimensional ways of working before presenting a case from an interdisciplinary project. The case demonstrates how the proposed model facilitates the development of skills in both design thinking and interdisciplinary working. It critically discusses how Match Studio negotiates the ‘togetherness’ (or not) of university disciplinary domains, research practices and professional engagement through a design practice lens, and explores interdisciplinary teaching through a reflective practice model (Leijen et al., 2014). Finally, it turns to Richard Sennett’s (2012) discussion of dialogic and dialectic communication to explore the ways in which successful interdisciplinary collaborations might be facilitated in higher education contexts.

Author keywords

Interdisciplinary teaching; interdisciplinary research; co-creation; Match Studio

Introduction

Match Studio is a dynamic research and learning space based in the school of Art, Architecture and Design (AAD) at the University of South Australia (UniSA), where interdisciplinary teams of students, academics and industry partners engage, think, learn, and co-create innovative responses to real-world challenges. Match Studio applies design thinking and co-creation methods and methodologies to facilitate collaborations between teams of students, industry, and academics from the over 45 academic disciplines at UniSA. Match Studio has a number of engagement models, with varying levels of disciplinary specificity and intensity.

The overarching philosophy of Match Studio is ‘designed to make a difference’. This difference is manifest through both process and outcomes. Match Studio is design-led and concerned with understating the changing role of the designer and how this plays out in an interdisciplinary project environment. Each Match Studio project develops interdisciplinary communities of practice that act as experiential and embodied learning environments alongside traditional design-based outputs. These communities of practice include a range of disciplinary backgrounds and develop a shared understanding of what it is to work in these cooperative and extradisciplinary ways. This paper describes through a case study how Match Studio helps students from different disciplines to explore and share their own practices and understandings of their expertise, and to build collaborative relationships across the traditional boundaries of the academy. It then reflects on this case through the lens of Richard Sennett’s (2012) notion of dialogic and dialectic communication.

Design and interdisciplinary work

Universities around the world have established the need to train graduates that are capable of working on Wicked Problems, that is, those problems that require the cooperation of vast numbers of people from a variety of academic, technical and social backgrounds (Rittel & Webber, 1973). This has been recognised by the World Economic Forum who suggest that “for the cities of tomorrow, collaboration as well as co-creation and co-design capabilities are the new must have competencies” (2016, p. 58).

Within the field of design, this is a continuation of Nigel Cross’ (1972) notion of “the coming of the everyman to design” and can be seen as an opportunity to equip graduates with the skills and knowledge to lead ‘design-led’ processes (Binder et al., 2015). Design-based processes however, have also gained currency in business and innovation with Tim Brown (Brown, 2008; Brown & Wyatt, 2010) and Ezio Manzini (Manzini, 2011; Manzini & Coad, 2015) leading explorations on how design processes can interface with innovation. At the same time recognition of the need for multi-, cross-, inter- and trans-disciplinary work is growing, although largely without meaningful understanding of the nuanced differences in these ways of working (Stember, 1991).

Within design schools, Manzini (2011) suggests there is a significant opportunity for designers to lead significant social change, while Tan (2010) and Forester (2013) describe new roles designers can take in projects, including researcher, strategist, facilitator, moderator and mediator. While some (such as Frediani, 2013) suggest that the field of design has been slow to adapt to this way of working, the uptake of processes like this can also be encouraged by the other (non-design) disciplines involved.

Engaging across disciplines requires us to think not only of the different roles of the designer, but also of the different roles of the professional. While designers are looked to as facilitators or leaders of these processes, the co-design literature (see for example Del Gaudio, Franzato & de Oliveira, 2018) highlights the significant benefits of also educating non-designers, particularly end-users in these skills.

It is not unreasonable to suggest that participation in co-design, co-creation, or indeed any form of interdisciplinary process requires a certain skillset; that is, one might define working in interdisciplinary teams as a discipline in and of itself. This notion of a discipline of interdisciplinarity may seem a little overly complex and hyperbolic, but its importance begins to become foregrounded through visualisation.

One of the ways in which interdisciplinary collaboration is visualised is through the concept of the T-shaped professional (Bridgstock, 2009; Karjalainen, Koria & Salimäki, 2009). The vertical bar of the "T" represents deep disciplinary knowledge, while the horizontal bar connects with other disciplines. When connecting multiple disciplines together, the assemblage starts to form the shape of a key (Bridgstock, 2009). This key is a useful metaphor for interdisciplinary working groups because it describes both the strength of collaborative working, and the necessity for different assemblages of disciplines to address different problems and challenges. Figure 1 provides an illustration of the key assemblage with the connecting barrel or bar of the key representing the collaboration process. In this figure, the bar has been expanded and labelled to represent the role of the facilitator (Tan, 2010; Forester, 2013). The other disciplinary labels assigned to the elements in Figure 1 correspond with the case study that will be discussed later in this paper.

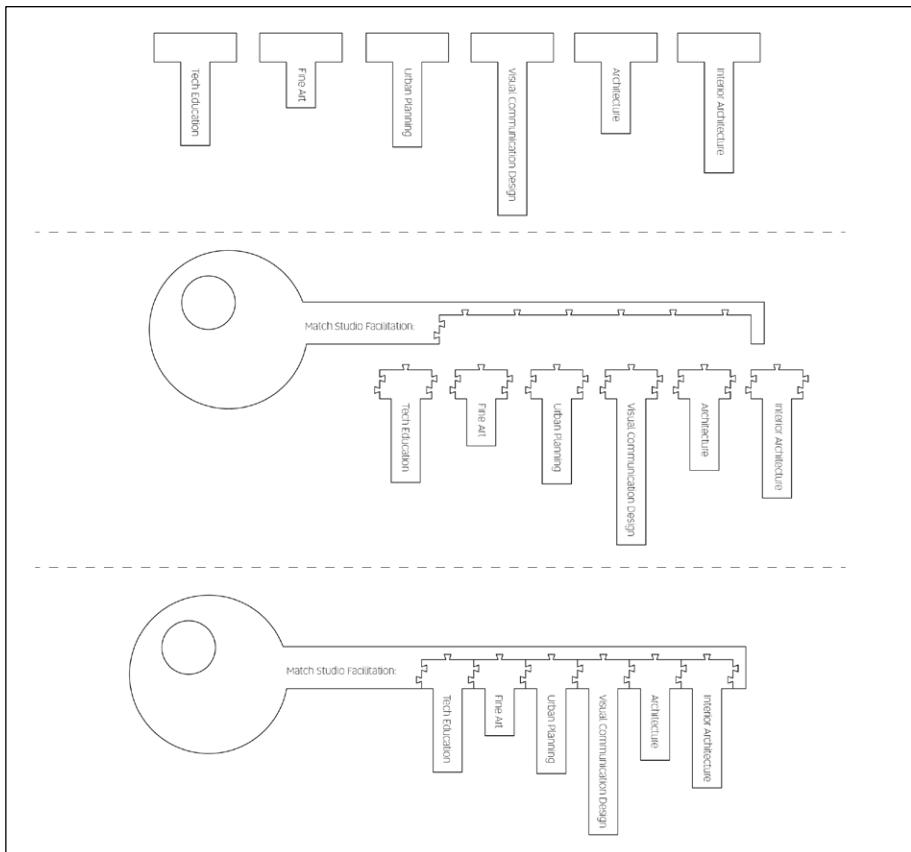


Figure 1: The key as a model of facilitated interdisciplinary collaboration

In Match Studio, interdisciplinary work is partnered with industry projects to combine Work Integrated Learning with the structured development of transferrable skills. The benefits of Work Integrated Learning are well established and many universities around the world have implemented in various forms team-based challenge programs that often work with industry to solve problems, or placement programs that expose students to the complexities involved in working in a 'real-world' environment (Cooper, Orrell & Bowden, 2010). Perhaps the most famous examples of interdisciplinary industry linked Work Integrated Learning upon which elements of Match Studio are modelled are the pioneering work of MIT Media Lab, DSchool at Stanford, and the Design Factory at Aalto University.

Case study

The following case-study reveals how the philosophy and pedagogic approach of Match Studio plays out through a practice-based interdisciplinary research project and reveals some of the benefits as well some of the issues associated with this type of model. The case draws on the case study method described by Yin (2009) with multiple data sources and perspectives evaluated to ensure the construct validity, internal validity and reliability of the research data, and the

researchers' experience on other projects drawn upon to make some assumptions about the external validity of the research. The approach when carrying out the case study project also drew on elements of Grounded Theory (Glaser & Strauss 2017), in particular the formulation of theory during rather than prior to a case study, to allow theories to emerge through the research. Data sources used to inform the analysis include reflective practice (Leijen et al., 2014) journals kept by both the academic staff and each of the students involved in the project, course evaluations, and industry feedback.

Following the presentation of the case study, the paper explores this case through the lens of Richard Sennett's (2012) work to examine whether his distinction between dialectic and dialogic models of communication and collaboration can be used as a basis for structuring the education of interdisciplinary professionals.

Match Studio case study: Magill Education Precinct SMARTSchool

Introduction

In April 2017, a team of 12 students from architecture, urban planning, interior architecture, fine art, visual communication design, technology education, primary teaching, and secondary teaching participated in a Match Studio project (course) that explored the threshold between indoor and outdoor learning spaces in the context of a new campus-based SMARTSchool project at UniSA¹. During this project, students worked together to identify and develop ideas for presentation to a number of stakeholders: the client – the UniSA project management team and project steering committee; the architects working on the project; and various community members. The course was structured as a two-week intensive, running each day during a non-teaching period, and then continuing weekly for four evenings leading up to the final client presentation in May 2017.

Developing the course structure and project brief

Match Studio works with a broad range of client types, from small start-up companies to large service providers, and government departments. In this case, the client was internal so there was an opportunity to test the realignment of the focus from the outputs to the process. While in this case a partially internal client helped give freedom to allow this open-ended exploration, this

¹ As home to the largest cohort of teaching students in the state of South Australia, the purpose-built SMARTSchool located at UniSA's Magill Campus is a key initiative in the development of UniSA's Education precinct. The new facility features an array of Samsung technology including large form screens, video walls, outdoor pcs, smart phones, watches and tablets, virtual reality headsets and a digitally connected environment like no other in South Australia. The facility is designed to be a flexible education space, which can be configured in a number of ways for specific teaching and learning experiences – it's a way for people to work together in new ways. (<http://www.unisa.edu.au/smartschool>).

kind of approach has also been tested with external (industry) clients where expectations of deliverables are higher. In either instance, a client that this willing and open to engage in speculative design responses that might challenge their initial expectations is critical.

The brief of developing ideas that responded to the threshold between indoor and outdoor learning environments was influenced by the client's difficulty in conceptualising what the students could meaningfully contribute to an infrastructure project where the design work had already commenced. By focussing on an area that was related to but not directly overlapping with what had already been finalised by the architects, the students were able to produce work that could be integrated into the overall project without contradicting the existing design. The real-world nature of the project provided students with motivation while the specific focus provided the client with useful outputs that could meaningfully influence their thinking.

In line with Match Studio's desire to teach interdisciplinary courses, it was decided with the project steering committee that the course should try to attract students from a broad range of disciplines, including the schools of Education; Communication International Studies and Languages; Art, Architecture and Design; Information Technology & Mathematical Sciences; and Natural and Built Environments.

Attracting students

There was some difficulty in initially reaching students from across the broad range of disciplines targeted. This was attributed to a number of factors, including the difficulty in getting responses from program directors, a very low response rate from students, and some difficulty in communicating the proposed content and structure of the course and creating opportunities to co-design the course structure with busy academics. This difficulty highlights a common problem in that unconventional teaching / research models can suffer from sitting outside of the conventional teaching paradigm and which are initiated by academic staff with no established relationship with the students. The interdisciplinary model of Match Studio courses is also relatively new in the university, so there is not yet broad knowledge or understanding of what the opportunities may be with students across the university. In subsequent projects, Match Studio has been more successful in attracting students from across the university, including from disciplines within health-science, information technology, and business.

Intensive course delivery

One of the aspects of this course that worked particularly well was working intensively on the project during a non-teaching break. The daily contact between students, combined with a workspace that they took ownership over, helped to create an 'office-like' and professional environment (Figure 2 below). This delivery mode also made timetabling easier, particularly given the very different programs and enrolment patterns of the students involved.

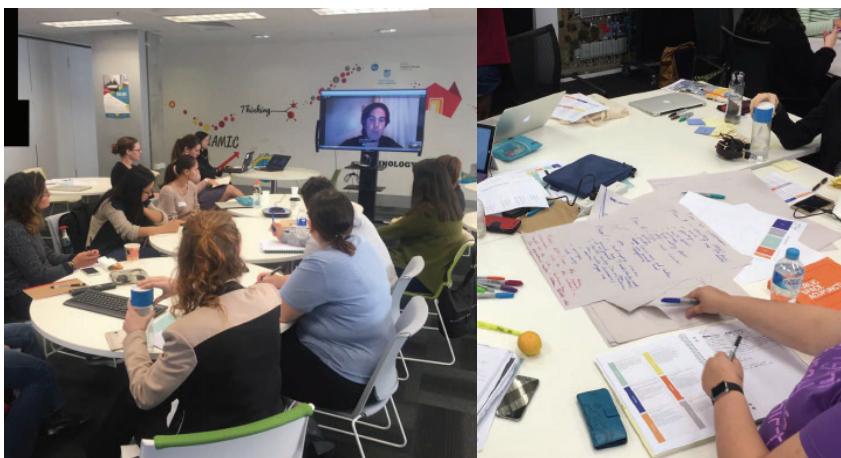


Figure 2: Students working in the Match Studio course environment

Once the intensive period had finished however, other subjects and other deadlines began to compete for the attention of various students and it became more difficult to have the interdisciplinary teams working collaboratively in the lead up to the final presentation.

Client engagement

Because this was a live project, the students had the opportunity to be briefed by both the client (the UniSA project management team) and by the architects that at that stage were undertaking a preliminary sketch design. However, in order to quickly extend the inputs that the group was exposed to, a range of academics from the School of Education and from the School of Health Science with an interest in the design of education facilities were invited to a preliminary workshop. Rather than making formal presentations, the invited guests were distributed among the student group and participated in a range of activities, sharing their knowledge and passion informally rather than formally.

Following this initial workshop, a further series of seminar sessions were run with guests including futurists and curatorial staff from a new Museum Of Discovery, a representative from Samsung Electronics, and the Chief Cabinet of EDUCAR within the Argentinian Ministry of Education. These seminars allowed the student group to explore and co-create the detailed project brief with a broad range of stakeholders and inputs and challenged them to identify an issue or series of issues to respond to rather than focussing immediately on the project outputs.

The seminars were deliberately set up as round-table discussions rather than expert-panel sessions to create a level playing field for students where their thoughts, ideas, and creative direction were equal to those of the expert guests. This created an atmosphere of respect where students engaged with at times very senior academics and industry representatives in a very professional manner.

Students made two formal presentations of their work to the client, industry representatives, and other interested parties. This enabled the students to reflect on the feedback they were given about their ideas shown at the first presentation, and to address this feedback and refine their concepts for the final presentation. Each of the guests involved in the seminars and introductory sessions were also invited back to give feedback and see where the ideas they had contributed had led.

Guided interdisciplinary working group sessions

Students involved in Match Studio projects are generally coming into the projects without having met each other. This is because students came not only from a range of academic programs, but also a range of year levels within those programs. Because of this challenge, a significant amount of time was spent mentoring and helping facilitate a positive group dynamic and helping students to communicate across traditional disciplinary, year-level, and social boundaries. During the intensive period of daily workshops, each day commenced with an icebreaking social activity that worked to break down barriers and helped students to connect at both professional and personal levels. This is unusual in an Australian university context but was considered critical for the development of the trust necessary to promote positive collaboration.

Regular peer-reviews were conducted across the period of the course, with minimal prompting from Match Studio staff to ensure the project was being driven by the students. There were some occasions where Match Studio staff stepped in to guide the direction of an idea, but this was limited to occasions where the proposals would have significantly deviated from the project brief.

The skills development workshops model

While Match Studio has always worked to develop transferable-skills for students both formally and informally, in this course, a more rigid model was tested that delivered a skills-development workshop each day. These skills development workshops delivered content that Match Studio teaches through its professional consultancy and executive education programs. This marked a shift in the delivery mode from focussing primarily on the output that students were working toward, to a focus on the experience the students were gaining and the skills they were developing. These workshops were extremely well received and addressed amongst other topics; user-centred design, project management, design thinking tools and group decision making techniques.

These hands-on workshops were run for 1-2 hours at the start of each session, but students continued to apply the skills they learned through their project work. This element of the course was the most difficult to integrate within existing university teaching and assessment structures, but the most highly regarded by students.

Project brief responses/outputs

There was a large variety of projects, but all focussed on examining and questioning the future of educational spaces. Particular care and attention was paid to the use of technology as a device to augment rather than replace physical experiences, and to the role of play and fun in education. Project

responses included; a children's storybook that explained the project through a narrative, a masterplan concept for connections between green spaces on the UniSA Campus, a research presentation about and recommendations for sensory experiences of students at various points on the autism spectrum and an analysis of how the current curriculum could be taught in the spaces that were proposed.

Presentations

The presentations were exceptionally well received by all who attended. The fact that the student concept made a valuable contribution to the SMARTSchool project was illustrated by an invitation by the construction project manager for the students to continue to be involved in the project's development.

The self-directed brief activity allowed students to explore how they could contribute to the project from their own disciplinary background, as well as how they could come together in small working groups to work collaboratively on parts of the project that they did not have the expertise to complete on their own. However, requiring students to devise their own project brief in line with a problem-based learning model was a challenge for some students who grappled with the concept of defining their own project requirements, even when given a framework through which to develop their brief.

This difficulty appeared to stem from:

- previous experiences of university assessment where detailed technical requirements were defined before the beginning of the course,
- students being unsure how their own disciplinary background could contribute to a project, or
- students worrying that this approach would not satisfy the requirements of their home (enrolled) course.

Scaling up

This project was undertaken as one of a series of pilot projects to develop the Match Studio interdisciplinary course model. It explored how skills workshops can be incorporated with interdisciplinary working sessions to deliver meaningful outcomes for both the client and the students. The small group atmosphere undoubtedly contributed to the students feeling as though they were important and to take a very professional approach to the way they engaged with the course. However, because of the demands for scale in the higher education system in Australia, other Match Studio courses are investigating the facilitation of multiple 'small-groups' within larger cohorts of students.

Despite a desire for more real-world project experiences in degree programs, there are few opportunities available for some students to enrol in Match Studio elective courses. Where large numbers of students from one program are able to participate it can be difficult to the right disciplinary mix for each project.

Student reflections and testimonials

Table 1 below presents a selection of feedback provided by participating students at the end of the course are presented. For ease of reading we have divided the comments into commendations and challenges.

Commendations	Challenges
<p>For this course, Match Studio has united a team of individuals with very different backgrounds as well various levels of expertise within their specific field. On the first day, none of the students knew each other. We were simply strangers, excited and enthusiastic about working together towards a common goal. Our tutor from Match Studio, developed throughout the course, various personal exercises that would bring us closer as a team which then leads to a better project outcome . . . At the end of the intensive two weeks we grew familiar with one another and a lot more comfortable and laid back, which lead to more expressive brainstorming sessions as well as a more collaborative environment.</p>	<p>My expectations of this project were quite low when I was told what we (the education students involved) would be doing. I understood that we would be participating in the project as a form of consultant to the design students who were undertaking Match Studio as a mid-semester break course. My experiences in the past of being in a consultant role were frustrating as more often than not my knowledge and experiences were often ignored, if listened to at all . . . However, I was pleasantly surprised that all my initial reservations of the project were unwarranted.</p>
<p>The structure of the course allowed for organic connections to occur between team members. I found it interesting how even the most introverted members quickly became comfortably engaged with others, and I believe the exercises allowed for positive participation for all. Cross-disciplinary collaborations are a vital process that enables projects to have a more detailed and meaningful end product. Everyone that participated made a genuine and unique contribution to the team, which made for an enjoyable and meaningful learning experience, which I hope everyone shared.</p>	<p>The biggest issue I had with this project was expectations. For me and the other education students who were participating in the project as an industry placement (essentially as a single assignment for another course) the expectations were not clear.</p>
<p>We were given a significant amount of support in presentation experience and skills prior to our final presentation which allowed the group to present professionally.</p>	<p>When I agreed to undertake the Match Studio project I did so with little understanding of what I was in for. As the course was offered as a voluntary experience through one of my core subjects I expected my tutor to provide me with a greater insight into the project. This however was not the case; I instead entered the experience knowing little more than I would be part an education team consisting of my peers and something called a SMARTSchool. Whilst the lack of information was unwelcome, the aspect I found most frustrating of the experience was the lack of clarity around the expected dates and times I would be attending . . . This made things extremely difficult due to my full-time work commitments.</p>
<p>I found that [the course] allowed for theory-based knowledge and pedagogy hands on practice to merge together and consolidate what I have learnt and developed over the past four years of my degree. It was a way to see all the theory be represented through something real, rather than simply reading about how to set up the ideal classroom . . . there was a clear picture painted in front of me.</p>	<p>Whilst eventually I would have a clear understanding of what was expected of me, I initially found this difficult to deal with as I was unclear of the scope of these expectations and what was required to pass the course</p>

Table 1: Student feedback and testimonials

Facilitating dialogic collaboration

The case study presented above provides a snapshot of how Match Studio is approaching the challenge of educating professionals who have the skills to engage in design-led interdisciplinary projects. In order to understand this model in more detail, the case will be reflected upon through Richard Sennett's (2012) seminal discussion of dialectic and dialogic communication and collaboration.

Dialectic communication can be traced back to Socratic argument, with two view-points argued to reach a final consensus (Sennett 2012). In a collaborative process, this would be characterised by the playing out of power-relationships and compromises to reach final agreement. By contrast, dialogic communication has its roots in the work of Mikhail Bakhtin (1981) and is focussed on the establishment of shared understandings (Sennett 2012). This is often seen in complex diplomatic negotiations and relies on building relationships and building strong two-way communication.

Dialogic models of collaboration are focused on building trust, reducing power-inequalities, and allowing multiple threads or ideas to be pursued simultaneously. Dialectic models by contrast focus on narrowing ideas toward an agreed decision (Sennett 2012). In the case presented, there are three key moments where a dialogic rather than dialectic approach is foregrounded:

1. Using facilitation techniques to reduce power-imbalances
2. Defining and working toward many (or few) outputs
3. Defining success through the experiential qualities of the process

Using facilitation techniques to reduce power-imbalances

During the briefing workshop and seminar sessions, invited guests were asked to contribute through a round-table format where they were treated as much as possible as equal with the students. This involved facilitating discussions that allowed invited experts to speak *with* rather than *to* the student group. This enabled a shift from the invited experts being seen as having facts and answers, to being a trusted source of knowledge and experience that students could bounce ideas off of and share knowledge with. By valuing the students' contribution of their experiences and knowledge, these sessions were able to focus on sparking conversations that could enhance and deepen the understanding of all involved.

Defining and working toward many (or few) outputs

This project was defining as an open-challenge without specific requirements for outputs. Although as evidenced in the student feedback, some students struggle with this process, valuing all forms of contribution privileges the richness of the responses of the group. By encouraging a variety of contributions based on disciplinary standards and expertise, the challenge for the group became how to thread a continuous narrative through the work they had produced. The uncovering of this thread is a dialogic process, highlighting the complexity of

the thinking, and searching for what the responses have in common rather than making value judgements to form a single dialectic argument.

While the client will ultimately undertake a dialectic process to privilege some elements of the response over others, the process of developing a shared narrative helps the group to understand each other's disciplinary practices.

Defining success through the experiential qualities of the process

The success of this project was defined by the collaborations and interactions that took place as a part of the process as well as the final product(s) produced. Qualitative assessment in universities is often reliant upon one or more people in a position of power passing judgement on the quality of a student's work. While often necessary, this form of assessment does not allow critical self-reflection. Match Studio instead uses reflective practice (Leijen et al., 2014) as a model for defining assessments and evaluating project success.

In the case presented, the student team had the opportunity to share their work with the client and other interested parties from academia and industry to stimulate a discussion about the macro-narrative, as well as the quality of the outputs that were being generated. This was paired with regular facilitated peer-feedback sessions that encouraged constructive feedback and shifted power from the teaching staff onto the student group.

Students were required to submit a reflective journal describing their experiences during the course. This is a record of their individual contributions, but also, more importantly, an exercise that allows them to reflect on their interactions with others, and on the skills that they have developed through the process. In this project these reflective pieces particularly focussed on the skills that were developed, and the fact that for many this was their first positive experience of working in a team. By collecting this kind of information, the project's reception by the client can be combined with the reflections of the students to present a more balanced evaluation of the process and allow for verification of the teaching model and continuous improvements in delivery.

Conclusion

This paper began by discussing the need to educate graduates from all disciplines that are capable of working in complex interdisciplinary teams. It introduced links between design-led processes and innovation, as well as the suggestion that facilitation is an important part of interdisciplinary team development. It then outlined the Match Studio model of combining industry-partnered projects with formalized transferrable skills development modules. The model was demonstrated through a case study to suggest how soft-skills can be taught as a part of industry-linked projects in higher education settings. It discussed a shift away from outcome-based assessment toward process-based assessment, and showed how the framework of reflective practice is being used to drive innovation in course delivery and assessment.

The final discussion then linked the presented case with Sennett's (2012) work on dialogic communication and collaboration and suggested ways in which this could be used to structure interdisciplinary pedagogy in higher education

institutions. The learnings from this paper contribute to the knowledge on interdisciplinary education as well as design education and suggest an opportunity for design schools to reach beyond their disciplinary borders to engage in broader education practices.

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Using Social Change Storytelling to Teach Design Agility

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Abstract

Design educators are often faced with the challenge of teaching both fundamental design skills and advanced design skills to prepare students for handling complex real-world design problems. Fundamental design skills are often taught within the context of constrained assignments to target a particular skill. Such tasks may frame the design problem and specify the required deliverables. Thus, students could become skilled at solving the problems they are given. While it is helpful to learn particular design skills, such design challenges leave students poorly prepared for the open-ended real-world problems, where designers are often tasked with poorly defined issues, and the design brief describes problem symptoms, not the root problem. Necessary advanced design skills involve problem finding, problem framing, strategizing, and implementation solutions. In this paper, we describe case studies of the Interaction Lab, and we discuss how advanced design skills, in other words, design agility, can be taught. We challenged students to make sense of free topics such as social bikes for the obese, emotional cars against road rage, and interactive galleries for a charity. Such issues are often practical but valuable to the public and pose great innovation challenges. Students began a project by brainstorming, then evaluating. The goal of immersing oneself in the process was to learn more about the interdisciplinary information and then tell an important story. After identifying the facts they deemed worthy of sharing, students structured the information to make sense of it and then constructed a story for a specific audience and context that moved the audience to action about the chosen issue.

Keywords

Social change storytelling; design agility; Interaction Lab; co-design; user-centered thinking.

Introduction

The world is changing at an exponential rate, and design curricula and courses are challenged to keep up. Designers focus more on the problems pursued and less on what design has been. Obviously, new kinds of issues are likely to require new types of thinking, doing, and multidisciplinary collaborations. Design as a field is continually evolving. The boundaries of design are shifting to accommodate new kinds of societal issues. Increasingly, designers are engaged in broader societal problems, for example, environmental degradation (e.g. Ortbal, Lange & Carroll, 1996), toxic chemicals (e.g. McDonough & Braungart, 2002), climate change (e.g. Steffen and Gore, 2008), voting rights (e.g. Lausen, 2007), and so forth. The design methods movement raised the need for new methods to deal with the increased complexity of societal concerns. Societal areas of human concern are described as wicked problems that cannot be easily reduced to a simple design problem. Many design disciplines are engaged in societal challenges. Examples include industrial design (e.g. Papanek, 1970), organizational change (e.g. Brown and Katz, 2009), instructions for continued life on planet earth (e.g. Fuller, 1969), and so forth. Design action within such areas of societal concern is sophisticated and broad in scope and often requires multiple design strategies to identify actionable design opportunities.

Different theorists outlined such shifts from designed artifacts to societal systems. John (1992) described four levels of design — components, products, systems, and community — to advocate new design methods for challenges such as traffic congestion and air quality. Doblin (1997) described three levels of complexity: products, the purest form of design; uni systems, coordinating products and the people that operate them; and multi-systems, the sets of competing uni-systems. Buchanan (1992) spoke of communication design (symbol), industrial design (product), interaction design (action), and systems design (thought) with new understandings of design that blur the distinctions between types of design.

Wasserman (2011) describes four versions of design to include design 1.0 as artifact-centric (e.g. making and selling stuff); design 2.0 as human-centric (e.g. strategic field building and embedding); design 3.0 as socio-centric (e.g. changing the world); and design 4.0 as the post-Anthropocene (e.g. sustainable prosperity for everyone on a planet). Pastor (2013), articulated the differences between four types of design that shift as levels of complexity increase: design 1.0, traditional design thinking; design 2.0, product/service design thinking; design 3.0, organizational transformation design thinking; and design 4.0, social transformation design thinking (see Figure 1).

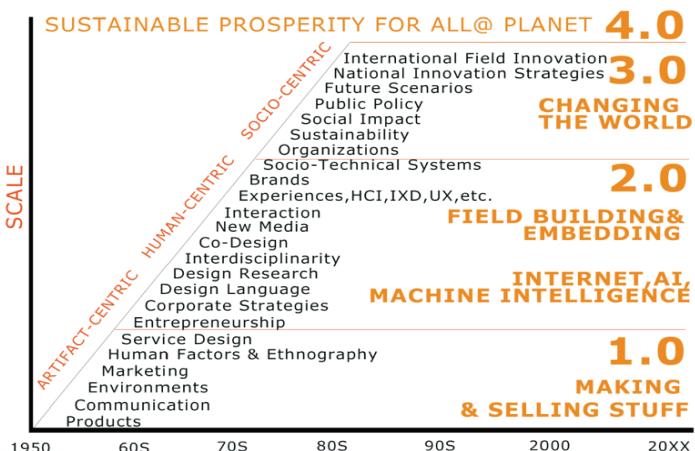


Figure 1. A brief timeline showing how the scale and scope of design have shifted across three different conceptions of design (Adapted from Wasserman, 2011).

Others more recently have added the “X” nomenclature to create designX to get beyond the number of designs (e.g. Norman, 2014). The designX manifesto argues for a broader version of design that shifts from a focus on products and services to a more extensive range of societal issues. Such changes in understanding of the field of design require students to grasp how conceptions of design as a human activity have evolved over time and presumably will continue to shift as time passes.

Designers working on new types of problems are continually challenged to develop new kinds of design methods and collaborate in new ways with other disciplines. Many seasoned designers have experienced such shifts throughout their careers, for example, the computer revolution ushered in new design practices such as interaction design and human-computer interaction (HCI). Likewise, the uncovering of user needs through ethnographic-like observation, now a common empathy-seeking step in design thinking, leads designers to develop new design research methods.

Such new design challenges enthuse some design educators, and others less so. From a pragmatic perspective, many design curricula teach a mix of what design was, what design currently is, and what design might be in the future. The challenge is to find a right balance. Students coming to design schools could be interested in design of the past because they could see ample examples in the world. Employers seek to hire design students with design skills of the present. Perhaps some design educators are mostly interested in the future permutations of design. How might such an ever-expanding range of topics be taught in a design curriculum? How might design skills being taught remain relevant?

One strategy might be to enhance students’ ability to learn to engage with new materials and skills. Teaching students to bridge such gaps explicitly seems like a lifelong learning endeavor since invariably new gaps will continually emerge.

Another strategy might be to provide new special-topic courses. For example, we teach a graduate design studio that focuses on emerging design topics. Every year, we explicitly choose new issues that students and we will have to learn together to engage.

Yet a further strategy can be about creating new minor degree offerings with the explicit mission of combining different disciplines. Students and faculty from various departments work side by side on emerging topics in specific courses.

Introducing design agility in our design education

Students often develop fundamental skills through highly constrained exercises that frame the design problem, list deliverables, and project outcomes. Often, they are given more responsibility in defining the parameters of projects as they move through design curricula. However, after three years of design education, they are rarely asked to think and respond quickly to design challenges, reflecting on all they have learned and applying methods and tools that are most useful for the tasks at hand. In their final year, students are often encouraged to spend a great deal of time immersing in a single project and design approach, which yields a highly-polished work instead of honing their ability, which will aid their versatility in professional practice.

Design professionals often encounter poorly defined design problems and design briefs that explain problem symptoms instead of articulating the root cause. Research indicates that innovation is linked to the ability to solve problems that are complex, unfamiliar, and non-routine (Mevarech and Fridkin, 2006). Thus, students benefit from learning to define their design challenges, frame problems, develop strategies, propose solutions, and implement their ideas.

To address the challenges that designers face, the School of Design at Jiangnan University developed an Interaction Lab that aims to boost students' design agility. This paper presents a case study of this eight-week Interaction Lab conducted in the fall semesters of 2017 and 2018. Senior year students explored design behaviors, specifically storyfinding and storytelling, as a means of engaging in complex, large-scale societal challenges. In an open-ended project, they explored how to develop sustainable research methods to study real-world phenomena. They used prototyping and a serious attitude to investigate ideas instead of focusing on a final work. In the Interaction Lab and project sections that follow, we describe: first, the theoretical perspectives that have shaped the activities; second, the activities students participated in; third, the works that students created; fourth, lessons learned from this lab; and finally, future plan for the Lab.

Interaction Lab's theoretical underpinnings

The goal of the Interaction Lab is to help students improve their design agility as it relates to the understanding and communication of complicated topics. Designers often face the challenge of using the knowledge and skills they have acquired throughout their education to quickly make sense of massive amounts of information and frame situations in ways that are truthful, concise, well-informed, actionable, and engaging. Not only does this relate to how designers communicate with their audiences, but also how they work within and define the

ever-changing field of design. Faced with such challenges, designers may benefit from understanding five perspectives: human (audience)-centered, design ability or design thinking, anticipating uncertainty, visualization, and co-design.

First, the Interaction Lab, which is set up for students who majored in visual communication design and industrial design, highlights human-centered design thinking. It requires “empathy”, i.e., to understand the design objects (people), to sense people's feelings, and to understand their real demands. During the design process, students are required to consider the object's context from the designer's perspective, to think and design based on the background, and to improve their agility towards design issues by storytelling.

Second, students are obligated to obtain the capability of analysis, research, and how to search for solutions. For this purpose, when confronted with the issue for the first time, students need to cultivate their ability from divergent thinking to convergent thinking, i.e., to seek design concepts related to the subject via divergent thinking and then find out the “proper” plan among mountains of concepts through convergent thinking.

Third, students need to embrace the strong uncertainty in interaction design. Perhaps it is not clear what challenges we are facing at the very beginning, and that is why we need to unearth the real problems and demands of the objects from reality. At the same time, interaction design involves an iterative loop going from uncertainty to certainty and returning to uncertainty. Every challenge in the iteration may be different and unexpected.

Fourth, in interaction design, visualization is a significant ability to embody the design concept or insight. Making prototypes is such a process. And the purpose of visualization is to get people's feedback by testing the concept and the prototype in the real world. The goal of the next iteration is to be determined based on the evaluation of the experience. Concept visualization is also an effective way to improve work efficiency and to motivate a group to brainstorm and exercise their imagination.

Last but not least, we introduce the concept of co-design to the Interaction Lab. Co-design, taking the user as a partner, studies the design-driven creativity (Sanders and Stapper, 2008). The process of collecting creativity shared by two or more people in any act can be called co-design, which is jointly created by researchers and co-designers. Co-design includes storytelling, collective sketching, affinity diagrams, mind-mapping, prototypes, and role experience. The classical theory of co-design focuses on participants' potential, tool's communicative performance, and researcher's driving factor (Curedale, 2013).

Interaction Lab's activities

In the first week of the Interaction lab, students were exposed to societal topics such as social bikes for the obese, emotional cars against the road rage, and interactive galleries for the charity. They were given a one-page overview document that summarized the different topics and offered links to interdisciplinary papers, popular media articles, documentaries, and so on. After they had covered as much information as possible to make sense of the topics, they could choose the item they liked, and worked in different groups.

Individually, students used post-it notes to document what they learned from their research. They were encouraged to write one idea per post-it note and link each note to a reference. Then as a group, they sorted and clustered their post-it notes on whiteboards or large cardboard panels (see Figure 2).



Figure 2. Students clustering post-it notes, mapping relationships between clusters.

In the initial immersion phase, students worked in small groups, with each person reading and synthesizing a small set of resources that they shared with the team later. This process enabled them to cull a larger amount of information in a shorter time than they would have been able to do individually.

The goal of the first week was to dig into the information-gathering, organizing, parsing, clustering, etc. The students would have a robust amount of data to review that provided accurate perspectives instead of a narrow, shallow understanding of the subject at hand. Nonetheless, at the close of this phase, they were overwhelmed by the amount of information that they uncovered and could be quite confused about how to proceed.

In the second week of the lab, students were taught how to make sense of the data and find a story worthy of understanding. One method involved raising the six questions (i.e., who, what, when, where, why, how). Another method involved using the six tools of co-design, which helped students look at the topic from multiple perspectives and determine other research questions.

In the use of tools, most of the co-design tools (see Figure 3) are derived from service design theory and user experience theory. They can be classified as follows:

"Collective sketches" is a fast and useful tool to develop ideas while explaining them. It can be used to share and dig out the group's insights (Greenberg and Bohnet, 1990). It can also be used to outline participants' vision towards the product and their experience.

“Storytelling” is not just a method of perception, but also a way to consider user experience, and can become part of a branding process (Quesenberry and Brooks, 2010). The useful information in the story is mostly about users’ understanding of life experience and their bonding with products.

“Mind-mapping” is a tool for visualizing ideas and identifying logical connections. The entire mindmap first puts an issue or an idea in the center of thinking, and then builds a thinking system around the center with marks, lines, words, and drawings (Moggridge, 2006). The mindmap can center on one idea or more.

“Affinity diagram” is a way of improving thinking efficiency through statistics. The diagram sorts large amounts of data by relevance and identifies the information group relevant to the topic. Post-it notes can help to start this kind of thinking mode.

“Process model” is an original prototype. It can be made using paper, post-it notes or PPTs. We handed over this tool to the participants, then observed them during the simulation, and processed after-use communication to obtain information about their user experience.

“Role experience” is to make potential changes against some functions. Students role-play as participants or designers to simulate a service experience. They can practice service scenarios or exchange roles multiple times.

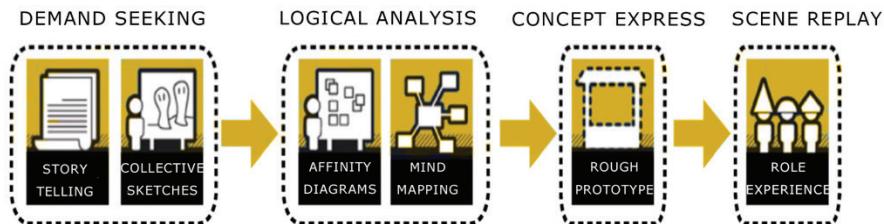


Figure 3. Tools and functions of the Interaction Lab.

Students were required to use the six tools of co-design to identify what they would like to understand and learn more. They were encouraged to research the issue from multiple perspectives until they comprehended it well and could explain it to others. They made the second round of sketches to crystallize their understanding of the story. As they clarified the story to themselves, they were encouraged to begin brainstorming various ways that they could use design to communicate their story.

During the third to fourth week, students continued iterating design concepts. After considering their target audience’s demands, they established the story’s relevance to the audience, framed the message, and proposed its form. They found what served as critical information to convey, i.e., why, to whom, and in what context. The topics have already defined a specific audience, and students created a story about each of them.

For example, the storytelling of the topic “the emotional car against the road rage” reads like this: Sara’s daughter suffered from a high fever last night. While Sara brought her daughter to the hospital, she drove the car at high speed and cut out consistently. If this car could show the reason and scene to the other vehicles behind, communication between drivers might be enhanced and the driving behavior and experience be improved” (see Figure 4). The students were encouraged to tell this type of story to aid people’s understanding, sketched the scene and circumstances, used post-it notes to do the affinity diagrams, and finally did mindmapping to analyse the internal logic of the information. As soon as the students had thought critically about these concepts and understood how to frame and present the story, they also tried to resonate with the group members, and we could move to the next stage- evaluation.

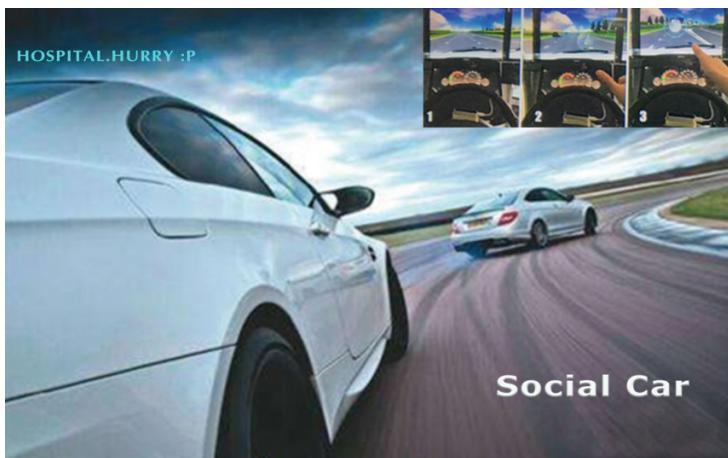


Figure 4. Storytelling of the “social car” driving environment and interface.

During the fourth and fifth weeks, the concepts were prototyped and discussed via peer-to-teacher and peer-to-peer critiques in the studio. Students were encouraged to consider the whole system and sketch how their system worked overall. They were then urged to think of what parts of the system needed to be further developed to include the more practical functions and what kinds of user interface could be designed in a more user-friendly manner.

For another topic “social bike for the obesity”, the target audience was defined, and the story was presented like this: Carl was an entrepreneur; several years ago, his company closed down due to financial crisis. He was grieved over too much and couldn’t control himself; he took excessive junk food and then became obese. By chance, he went into the fitness club and joined the social bike group. After training year by year, Carl developed great confidence and had then regained his status in the business circle.” The students got interested in the topic and quickly went into analysis. During the process, they created prototype including the training section, calories burnt, meal plans, and so on. They enhanced the communication between people and improved the outlook and health for obesity (see Figure 5).



Figure 5. Storytelling of the “social bike” system function and user interface.

In the sixth and seventh weeks, students refined their works and presented their design concepts and strategies to the class and their defined audiences. They did role experience during this section, against some potential problems and improved functions on the prototype. The last topic was “interactive galleries” (see Figure 6). It described as a care center for the elderly through story sharing. Through this kind of design, we tried to solve the social problem caused by a lack of communication and enhance the experience between the elderly in a charity.



Figure 6. Scene of the “Interactive Gallery”.

In the last week, students were encouraged to document their design process and reflect on their projects along the way. Students turned in their design process documentation, final pieces, and a self-evaluation of their lab experience at the close of the eight-week session. Next, we describe some of

the projects that students created and then discuss issues that have emerged in the course of the Lab.

Interaction Lab's projects

Here are some projects accomplished by students in the Interaction Lab. We practiced the agility design model and designed necessary procedures for the projects, including introduction of weekly knowledge points, case analysis and interpretations, presentation of questions, on-demand grouping, group brainstorming, situation design, empathy design, co-design, visualization of design products, sharing and exchanges of stories among group members, guidance and evaluation. For instance, the Lab designed and created three instructive interactive platforms to improve students' artistic and technical capacities. So far we have established "FRUIT Community" (*Guoshi Quan*), an online innovation base for college students, and "Smart Campus" and "Smart City," two digitalized platforms for interactive design and application of campus information.

FRUIT Community

FRUIT Community (see Figure 7) links online and offline classrooms, supplementing and extending existing teaching content. We provide a favorable online learning environment in which students have access to a great variety of learning and teaching resources such as courseware, teaching plans, teaching videos, situation immersed projects, online instructions, class-related communities, etc. They can also interact with teachers to timely solve learning puzzles and difficulties. In the meantime, we also provide a lot of employment and recruitment information on enterprises and support the uploading and downloading of excellent cases and videos.

We established it as a platform that shares knowledge, experience, wisdom, and joy through online research-style learning and in-person discussions. We did surveys, brainstorming and mind mapping in the first stage, conceived the draft plan and prototype in the second stage, then shared and accessed the program through storytelling among the Lab members and instructors in the final stage. The platform has been in operation for three years by now and has been constantly improved and upgraded to provide satisfactory learning and teaching experiences for students and teachers.



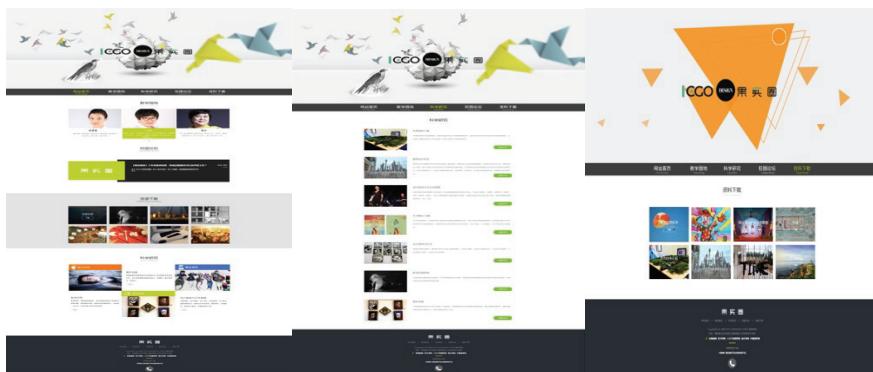


Figure 7. Web interface of “FRUIT Community”. Descriptions of the course materials are available here: <http://art.sanyau.edu.cn/?article/643.html>

Smart campus

Smart Campus was listed as one of the National Undergraduate Innovation and Entrepreneurship Projects in 2017. At the beginning of the project, we decided to focus on helping undergraduates to design and resolve the inefficient delivery of information on campus. The Campus highlights digitalized interactive design, leverages new media platforms, mainly smartphone platforms, and centers on the problem of how to disseminate public information more effectively through interactive circulation methods. It also enables students to self-manage their usage, eventually changing their passive reception of information into a voluntary selection. Students may also set their personalized learning and living schedules on this platform in light of their conditions.

As we developed this Smart Campus, we carried out survey-based user analysis to learn about the users’ demands and thoughts, which provided sound information and evidence for designing prototypes (see Figure 8) and visualizing production at later stages.



Figure 8. Rough prototype of “Smart Campus”.

Throughout the design of the application, visual design and interactive design were intertwined and interplayed. The more effective circulation of public campus information not only makes the university more digitalized but also represents progress in smart and on-demand information service provision (see Figure 9).

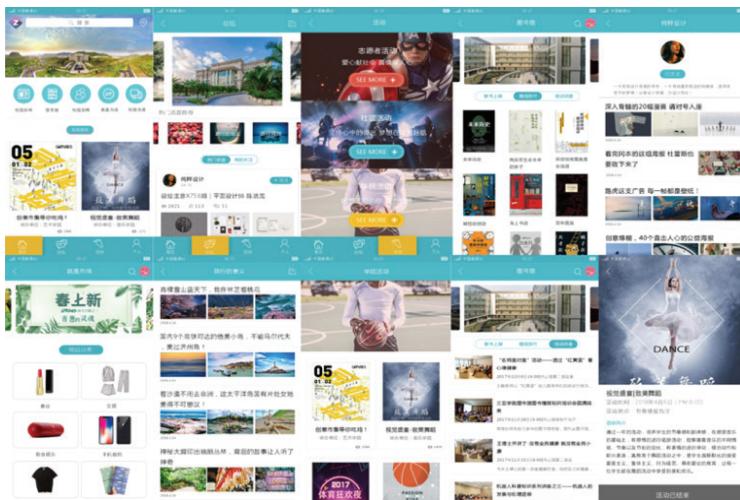


Figure 9. Sample user interfaces of “Smart Campus”.

Smart City

The Smart City project was listed as one of the National Undergraduate Innovation and Entrepreneurship Projects in 2016. We tried to tackle the gap in technologies and service models in urban public information digitalization. We mainly focused on smartphone platforms, for doing interactive circulation research and critical research. Through the study of basic theories, problem-oriented design, application framework construction, and model verification testing, we completed the research on the interactive circulation of urban public service information on the smartphone platform. The key to this study lies in the effective full-cycle management of local public service information, so that emergency response, information sharing, resource allocation and so on can be most efficiently monitored and managed (see Figure 10).

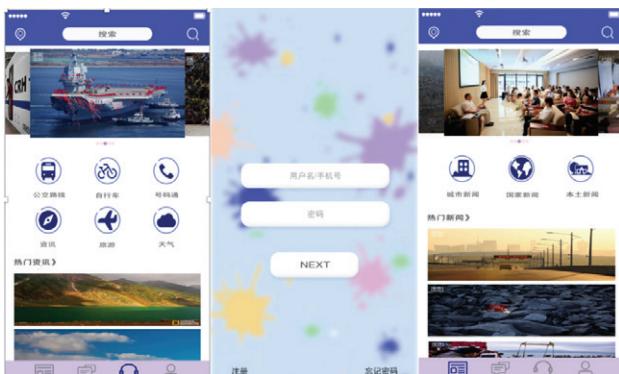


Figure 10. Sample user interfaces of “Smart City”.

In future research, we will carry out an in-depth analysis on the information framework of urban public services, service information gathering, public service information real-time updates, city life information alerts (such as discount information), and social network sharing content. The students have designed several roles for urban experiences, such as first-time tourists, ordinary workers, and seniors who come to the city every year. We will employ empathy mindsets to predict what problems they may encounter in the relevant context, record with sticky notes, and classify the problems with the affinity map. At the same time, we spur free thinking in the mindmap style and share and evaluate each role player’s experiences through storytelling.

Discussion and conclusions

Although the students and instructors were pleased with the outcomes of the eight-week lab sessions and projects, several challenges have arisen that are worthy of discussion.

It's challenging to shift from work-making to user-centered thinking

The topics that were presented to students to seed their investigations, such as social bikes for the obese, forced them to explore new ways of searching because there was no way they could focus on making works without better understanding the topic and identifying the cause of the problem and its vast tenets. At first, students struggled to adopt the mindset shift that would ultimately make them more agile designers as this type of systems thinking was foreign to them. However, once they had immersed themselves in the situation they quickly began to ask important questions: Where would the target audience learn of the issue? How would they receive the information? What media would be used?

Societal problems require multiple perspectives and methods

When tackling complex and wicked societal problems (Rittel and Webber, 1973), One must consider beyond customers and service providers to include multiple stakeholders (e.g. individuals, groups, organizations, communities, public policy makers), and consider differing values (Bronfenbrenner, 1979).

Storytelling is a vivid and concrete method to picture the situation objectively and narratively. "The imagination of narration - storytelling, is a basic thinking method...it is a major way of looking into the future, of predictions, planning, and interpretations. Most of our experiences, knowledge, and thoughts organized in stories." (Pink, 2006) Real and vivid situations are conducive for participants to analyze the problems confronting users deeply. In an era of profound social changes, targeted analysis of users' behaviors and possible experiences helps to focus on the demands of users during the exchanges of team members and the continuous update of products and thus further improves the agility of design.

Timescales aligning short-term with long-term

Short-term gains gathered much attention in design, namely, how to research and design products faster. Long-term timescales become a significant element to consider from a design perspective when focusing on massive scale problems linked to sustainability. It follows that design students must learn to design for short-term and long-term time horizons. Such challenges require that design educators learn to teach new methods in their courses.

What kinds of design agility can be taught? Design students often get stuck in a mindset of a designer as a "service provider" waiting for a client to approach them with a framed design problem. In short, designers solve design problems that the client brings to them. In the Interaction Lab as we described above, finding a design problem worth solving is part of the assignment. For example, students began investigating a societal-level problem and mapping the stakeholders involved and affected before knowing whom their client might be. The process is the complete opposite of the mindset of a designer as a service provider for a corporate client. Students at first were confused by the challenge to find a design problem worth solving, but they quickly became excited by the challenges of framing and solving such high-level challenges.

In this paper, we have described how the field of design is changing in general and, in particular, how design education needs to change to cope with social change. We provided examples from the Interaction Lab and projects that we developed and taught at Jiangnan University. These themes emerge from reflecting on the student experience in those courses: first, expand the scope of the students' design experience compared to that provided in traditional pedagogy; second, introduce new methods and skills needed to work on interaction project; third, provide students with learning experiences that allow them to re-imagine what it feels like to be a new kind of designer working on more extensive types of design projects.

Future work

In future iterations of the Interaction Lab, we will offer students the option of doing group projects. We are considering to introduce peer assessments to make individual contributions to the team more accessible to assess. Students will be encouraged to document and reflect on their design process during the Lab. We are considering to add more structured questions to trigger students to become more aware of the design agility that they are developing and help them transit from an educational environment to professional practice where they can

impact the world in which we live in positive, meaningful ways. Altogether, the three projects aimed at improving the creativity of people as part of a system, enhancing creativity, thinking capacity, experiences and communication, as well as yielding prominent and tangible results.

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New learning experiences. How the space planning and the technologies can be activators of innovative teaching methods

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Abstract

The future of design teaching is going toward new reflections and challenges in the field, due to the evolution of the users' needs and the new and updated learning models. New pedagogical approaches, based on active and blended learning paths, tend to consider a wider range of aspects going from the social conscience of students' and teachers' roles to the ever-increasing implementation of technologies.

This growing use of teaching practices, however, encourages a deep reflection on the design of learning spaces in universities and colleges. Nowadays existing spaces are generally unsuitable and ineffective to support the progress of an educational path based on the massive use of ICTs and digital supports. This lack of proper spaces must foster the revision of university environments - such as classrooms, laboratories, and connective spaces - in

terms of flexibility, personalization and collaboration, creating an envelope designed to support and encourage different types of learning practises.

The desire to stimulate the implementation of active and participative teaching by space's assets aims to support the students' involvement in the entire learning path, trying to enhance their creativity and encouraging the development of personal soft skills in order to face future challenges independently.

This paper focuses on the evolving requirements of learning spaces to become effective spatial supports able to make lectures as learning experiences developed by a network of different people and sharing of knowledge with a total involvement of them.

A specific case study of an on-going research project will be presented as an application of a set of tools and spatial guidelines for the implementation of an innovative learning environment in the University Campus of the Politecnico di Milano (Italy). Teaching experts were asked to conduct a survey on different learning activity groups (KPA, KPA and KDA) to identify specificities within a design didactic path and to define different levels of interaction with space.

The expected results aim at a deep rethinking of university spaces as environments able to induce a continuous mechanism of interaction between people and spaces according to changing and updating needs. Classrooms' setting must engage connections on different levels, creating and encouraging both real and virtual experiences using smart devices and immersive solutions. This learning space prototype specifically designed reflects the whole university environment as an alive and vibrant organism, composed of constantly moving information flows through actors, spaces, and supports for a 360-degree performing use, able to achieve a very high educational impact.

Author keywords

Keywords: Learning Environments, Higher Education Facilities, Collaborative, Spatial Design

Introduction

Universities' teaching offers are in continuous reviews thanks to the multitude of innovations that promptly influence the field of teaching. Although the social context has significantly changed over the centuries, universities continue to fulfill their role of training the future social class through the maturation of professional figures ready to enter an increasingly competitive world. However, the progress of technological proposals and the consequent need for speed most of the actions carried out daily are significantly destabilizing today's society towards an evolution extremely difficult to sustain. This speed also affects the educational offerings of universities and the latter require a constant review of their educational paths to better face the changes imposed by technological innovations.

In the last decades, we have witnessed the development of learning models that could be updated to the new generations of students born and raised in a strongly digital context. The increasingly low efficacy of adaptation shown by the passive learning model has encouraged a large number of teachers, scholars, and researchers to complement the canonical training path with a new method of learning based on a more involving approach. The active learning - the learning method where students are actively or experimentally involved in the process of understanding (Bonwell & Eison, 1991), has been able to patch up the difficulty of exchanging knowledge between teachers and students by promoting an effective type of learning for the latter aimed at a greater implementation of personal skills and communication abilities. The combination of these two types of learning creates a blended model where the classic relationship between teaching and learning, as well as the degree of relationship between teacher and student, is overturned through a didactic path that winds through a passive and active exchanging of knowledge (Maglioni & Biscaro, 2014). In all levels of education, from primary to tertiary, this hybridization of the learning system is emerging as a more performing innovation than the passive one (Christensen, Horn, & Staker, 2013).

New learning models are one of the essential details to implement an effective teaching afterthought. The different types of teaching, however, are always in contact with a physical environment that guarantees their development and proper functioning. Space is not only an outer shell that requires a series of purely structural features to be effective, and it is necessary to reflect more on the importance of its supporting role in an educational path.

The purpose of the paper is therefore to highlight the capacity of the classroom environment to be able to shape itself according to the different activities that take place within it. The research will specifically analyze the academic world of design and how it is important to have a performing space able to activate an innumerable series of functions, people and spaces according to changing and updating needs. Classrooms' setting must engage connections on different levels, creating and encouraging both real and virtual experiences using smart devices and immersive solutions. This learning space prototype specifically designed reflects the whole university environment as an alive and vibrant organism, composed of constantly moving information flows through actors, spaces, and supports for a 360-degree performing use, able to achieve a very high educational impact.

Learning spaces for different activities

In order to activate an innovative type of teaching such as the one presented, it is vital to design a proper learning space. Loris Malaguzzi, an Emilian pedagogue and creator of the Reggio Emilia Approach, defines the physical environment as a non-neutral dynamic in the learning process: "its structure, conformation, quality and teaching predisposition, are equivalent to a third teacher" (Edwards, 1993).

By designing new styles of learning in a social context much more dynamic and technologically rich, it is necessary to acquire greater sensitivity and cognitive ability to intercept the requirements transforming them into physical space. It is no longer possible to rely only on defined design standards, but it is necessary to take into consideration new variables, in some cases poorly

investigated, for a total re-planning of dynamic and effective spaces both in the present and in the future. Most of the classrooms that can be seen in contemporary universities present an extremely rigid structure with an almost null margin of modification and improvement. Teaching is an element in extreme transformation that over time has continued to redefine itself in its various meanings. Nowadays, however, its canonical composition has lost its expressive capacity, having to face the sudden advent of innovative tools. Unable to bear the weight of innovation, the environment, in most cases, is currently in a situation of pervasive inadequacy. Its lack of effectiveness is visible in the inability to support what the actions and behaviors of users require.

The increasing use of new innovative learning systems is profoundly changing the structure of the classrooms, favoring a design focused on the support of many interactions that are conducted both between teachers and students and through different groups of students (David J Neuman, 2013). In order to face these relationship dynamics, it is necessary to reflect on the learning spaces through different levels. Space has a high degree of influence on learning: materials, furniture, light (natural and artificial) are elements to be taken into great consideration for effective activation of knowledge that winds between the actors involved. However, if the installation is not conducive to optimal learning, even elements such as furnishings and other digital equipment can fill the functional need to perform better the primary function for which the spaces were designed.

Establishing an innovative educational path means reviewing all the founding components - pedagogy, space and technology (Radcliffe, Wilson, Powell, & Tibbetts, 2009) - in favor of the most possible flexibility. Mutability and plasticity must be set as essential elements to allow the activation of different educational paths in the same space. Besides being a top environment for flexibility, space should be optimized and prepared for those tools characterized by a high degree of comfort, safety, and functionality (Oblinger, 2005). The environments mainly studied for a single functional type can hardly reinvent themselves in time to be used again, and risk to remain incomunicable and unfit to perform other tasks. Although the space to be designed has indeed a precise vocation as learning, each university environment requires significantly different degrees of change depending on the activities to be stimulated. Humanistic teaching has more traditional spatial needs than a degree course based on the development of technology, where the degree of exchange and cooperation is decidedly higher. Universities dedicated to scientific studies require a high degree of permeability thanks to their need for specific and unavoidable spaces and tools for the correct execution of their mission. Some laboratory spaces have peculiar requests for system organization that automatically make them exempt from being part of a traditional classroom classification; however, if sometimes this spatial differentiation bases its motives on specific bases, at other times it can be considered as the result of an outdated vision of teaching spaces.

By focusing on the design world, it is essential to consider that the physical environment requires a different design sensibility than the canonical concept of the classroom. The value assumed by space is that of a porous environment with marked laboratory qualities, ready to support a variety of activities that

dynamically alternate within a narrow period of time. From the development of an idea to an ongoing revision with the help of professors, from the creation of prototypes to the final display of artifacts, we are immersed in a vibrant and continuously moving system. The need to perform different types of relationships between actors, tools, and space, therefore, requires a particular design at the service of activities and behaviors as essential design elements. This desire to create an effective environmental support to activate different types of activities will be analyzed later in the context of the School of Design at the Politecnico di Milano, where the design of a single space in support of a series of different teaching proposals is currently underway.

Objectives

Starting from the background presented before, the objective of this research is to understand if there are some parameters to refer to, able to design efficient environments and supports based on design disciplines during an active learning experience.

As mentioned above, the new way of teaching and learning are influencing the relationship between space, pedagogy and the way people interact with all the elements involved. Referring to the design field means to include scenarios with a different spatial-temporal dimension; various typology of disciplines, different scale of the design outcomes, different levels of proximity using the space, but also different use of the space over the time, with some temporary elements or long-term use ones.

When we are facing with pedagogy applied to the design discipline, it requires a new investigation on the different disciplines of design, different human behaviours, and the different needs related, in order to create a unique flexible learning experience in the classroom able to support all the predicted and unpredicted variables.

This paper aims to collect, with the direct involvement of the users, all the needs connected to each discipline. Is, moreover, fundamental to understand the right base level of a space that can support all the requirements that are common to all the disciplines, but it can also easily predict and solve the variable of each design discipline. The final aim is to create a unique flexible space, in terms of temporality and user's customization, providing opportunities to be shaped and adapted to the ever new nascent needs.

An Italian case study: Design at Polimi

A big challenge has emerged from present and plans of the Politecnico di Milano, defining a general programme with these primary goals for the next three years, to address the new contemporary needs on the topic by developing different prototypes of innovative university classrooms.

An in-depth revision of its spaces to understand the needs of all the university users, with a particular focus on the design discipline of the School of Design.

The primary purpose it's not only to rethink the environment referring to the design disciplines in general, but it's also fundamental to think about a system to combine the different subjects, with a total integration between them.

For these objectives, a research team of the Politecnico di Milano has been appointed to define a series of requirements and needs for the general organization of the innovative teaching and learning spaces, involving the users directly to investigate new demands in the field. The team has been asked to dissert on spatial needs, potentialities, new habits and uses, and organize all in spatial requirements in "directions", especially focus on the design field, to be applied to one classroom's prototype and then finalized and revised for large-scale dissemination.

Methodology

Since it has been decided to adopt a user-centered method, categories of research participants have been defined to involve them in the research process. It is possible to divide them into four categories such as internal actors experienced in teaching activities, internal actors experienced in innovative teaching, internal actors responsible for the maintenance of teaching spaces and external actors experienced in technologies applicable to the analyzed context. In this analysis, the teaching experts have been chosen as a focus of the research activity.

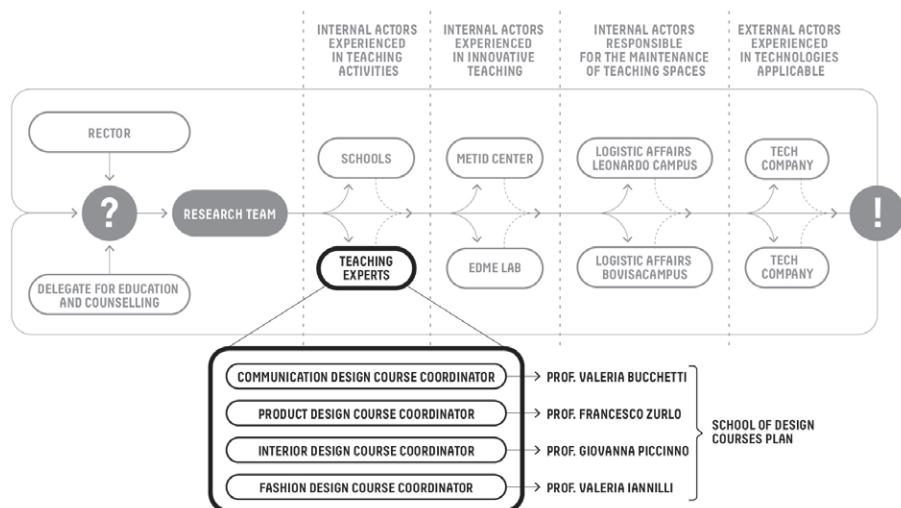


Figure 1. Map of the actors involved in the research process

We interviewed each Degree Course Coordinator, asking them to quantify, assigning a value from 0 (non-presence) to 10 (maximum presence), the presence of a specific activity due to the activities carried out in the laboratory courses. The figure of a Degree Course Coordinator is in charge of its own course plan that it's submitted to the course council (where disciplines and teachers are discussed) to follow, with the support and the supervision of the School's organs, a designed didactic objective. Therefore they are fully aware of the different typologies of activities that are carried on in a design course. We determined different parameters that are useful to find out the purpose of the learning space and that can help us to map the current activities related to the type of teaching provided within the same space.

Parameters for didactic activity

We can divide them in three different categories:

Knowledge Transfer Activities (KTA)

All the activities conducted by the teacher that aim to provide information and guidelines to the students and all the activities in which the students are involved in presenting their advancement. We can recognize activities such as:

- Frontal lessons: lesson for an audience of auditors
- Case studies presentations: presentations carried out with the support of specific communication elements, real products or experts
- Student presentations: presentations made by the students with different support elements and with a final debate for each presentation
- Seminars with guests: seminars with one or more speakers followed by round tables or debates
- Blended learning: mixed learning activity carried on partly online and partly in classroom

Knowledge Production Activities (KPA)

All the activities conducted by the students that aim to create new knowledge and result in which different learning activity approach are used. These activities include all those relating to the different teaching processes in which users are involved during the design phases. We can recognize activities such as:

- Brainstorming: activity carried out by students in groups to work on the assignments
- Project development (single or in groups): discussion among students
- Drawing: execution of design elements and technical details
- Prototype making: Study models and prototypes
- Revision with the teacher: discussion on the project with the teacher for further developments
- Collaborative feedback sessions: collegial discussion on the project to receive opinions
- Peer reviews: discussion among between two groups with reviews and comments

Knowledge Dissemination Activities (KDA)

All the activities that aim to show the didactic results and that are across the assessment activities and the pure show to the public. We can recognize activities such as:

- Written exams: moments of verification of the knowledge of the students addressed to the teacher

- Public presentation: Explanation of project developed to teachers and peers
- Prototypes show: show of prototypes and models
- Layout show: show of layouts and drawings
- Catwalks: show of wearable prototypes and models
- Media show: show of digital communication elements
- Exhibit show: show of didactic results opened to the public
- Extra events: other event connected with didactic results dissemination

The evaluation takes into account both their experience as a teacher and their understanding as coordinators of the study courses and therefore with a broader view of what is the situation of the teaching activity carried out within the courses. The collected data have been translated in the following visual diagrams in order to compare the different approaches of the study courses.

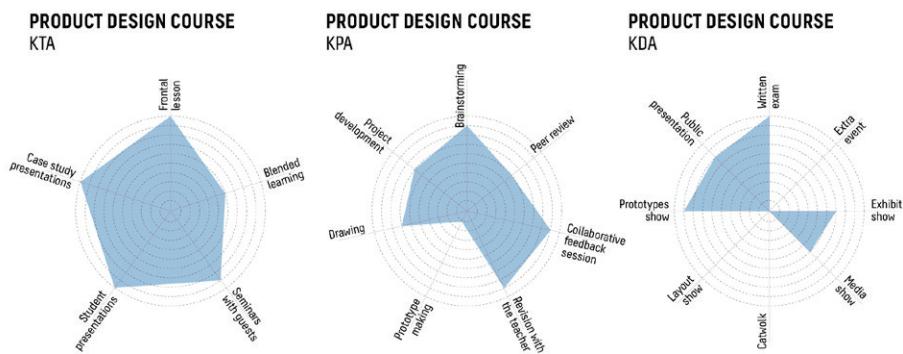


Figure 2. Product Design course diagrams

The Product Design Course diagrams show an high use of the classroom for the learning and relational activities (high evaluations for most of the KTA's activities of the KPA and for the activities of KDA that make a wide use of the space) marking the importance of space as a place for information exchange. Note that in KPA the rating of "Prototype making" is low because there are specific workshops for this kind of activities.

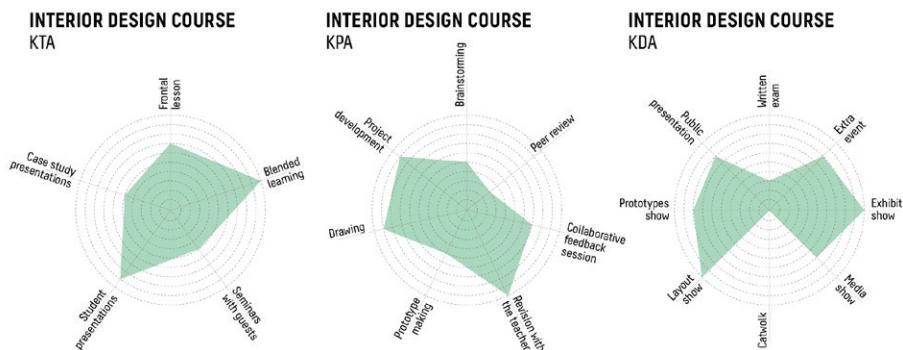


Figure 3. Interior Design course diagrams

The Interior Design Course diagrams show the importance of didactic activities such as those related to the project's phases and to those in which the student plays the role of protagonist. It is important to underline how activities such as extra events or exhibitions in which the students can show in a scenographic way the results of the educational path are important for the study course.

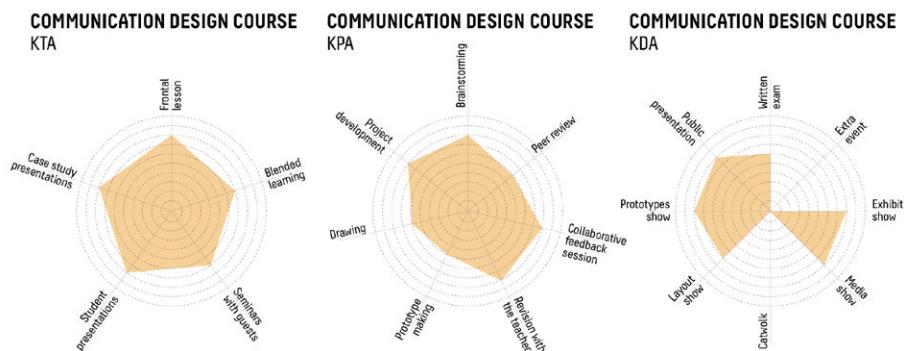


Figure 4. Communication Design course diagrams

The Communication Design Course diagrams show average-to-high evaluation for most of the parameters so it seems the all the activities are generally important. This is an indicator of the heterogeneity of the activities carried out in which both teachers and students are equal protagonists of the space.

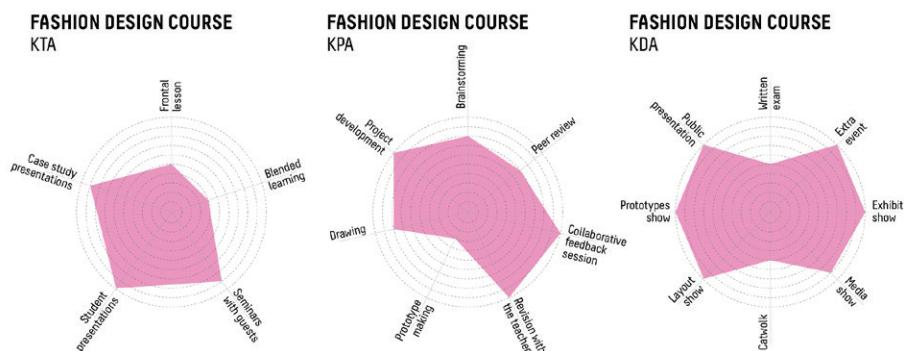


Figure 5. Fashion Design course diagrams

The Fashion Design Course diagrams show a general importance of all the parameters, especially in the KPA's evaluation. KDA's evaluations demonstrate a strong soul devoted to the exhibition of what has been realized in both different and specialized forms. All these indicators suggest the need of a flexible space, able to easily adjust according to the requested activities.

We can therefore interweave the diagram in order to better interpret the data and create rules and directions to define different configurations of the classroom.

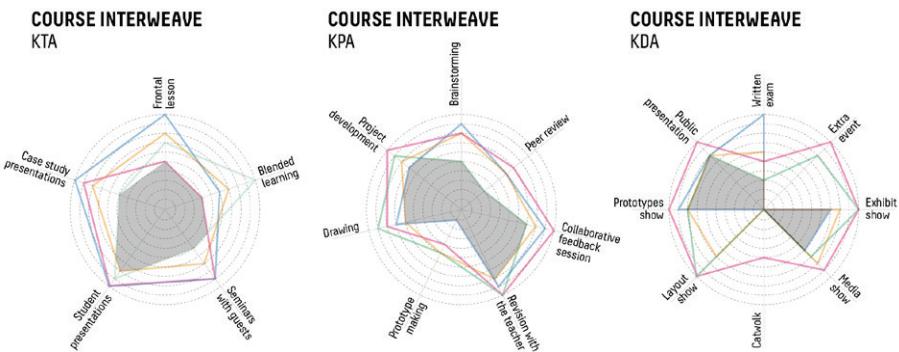


Figure 6. Diagrams of interactions between the four courses

Through the overlapping of the realized diagrams we can understand what are the minimum elements in common.

We can see from the KTA diagram that the study courses have a medium level of satisfaction of the parameters in common where, however, we find some peaks in some activities that seem fundamental and that reflect the nature in the learning process of the discipline of design. These activities are the presentation of case studies and student presentations. This translates into the preparation of an educational space that takes into account predominantly these activities, thus acting on technological equipment that optimally favors the transmission of information. In the KPA diagram many parameters indicate the need to foster the collaboration of users through spaces that, with the provision of appropriate technological equipment and furniture, can facilitate all activities where the comparison of ideas and the creation of new information are essential. Lastly, in the KDA diagram we note that the classroom must demonstrate the maximum efficiency with regard to flexibility of use and the ability to create new ways of showing space that translates into the creation of new surfaces, both vertical and horizontal.

Grammar of directions (GOD)

Starting from the previous considerations about didactic parameters for the four design courses, it has been outlined a common language to organize all the elements found. A grammar of directions (GOD) has been defined both to create a common base for the spaces of the new disciplines and to verify the types of intervention to elevate the space to an innovative and flexible status. In order to allow the development of a basal matrix to be updated with possible optimization interventions for the four different disciplines' peculiar activities, a scheme has been adopted to interweave the different spatial components with the possible degrees of intervention. The designed environment has to be able to support different types of teaching in the most elastic way possible and must, therefore, be ready to shape itself when necessary.

GRAMMAR RULES	BULDING	FURNITURE	TECHNOLOGY
BASE LEVEL	<ul style="list-style-type: none"> • ACCESSIBILITY • LIGHTING • DARKENING • ACOUSTICS • ENVIRONMENTAL COMFORT 	<ul style="list-style-type: none"> • FURNITURE ACCORDING TO THE NORM • SOCKETS 	<ul style="list-style-type: none"> • WIFI • PROJECTION • SOUND SYSTEM • WIRING
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> • FLOATING FLOOR • ELECTRICAL SYSTEM • SOUND-ABSORBING PANELS 	<ul style="list-style-type: none"> • MODULAR FURNITURE • WRITABLE WALLS • MOVABLE SOCKETS 	<ul style="list-style-type: none"> • VIDEO SYSTEM • ADJUSTABLE SOUND SYSTEM • MULTI PROJECTION • SMART BOARD • CLOUD + WI-FI
ADVANCED LEVEL	<ul style="list-style-type: none"> • FLEXIBLE STORAGE SPACE • WALLS EQUIPPED FOR DISPLAY • MOVABLE WALLS 	<ul style="list-style-type: none"> • TRANSFORMALE FURNITURE • FOLDING FURNITURE • INDUCTION/WIRELESS SOCKETS 	<ul style="list-style-type: none"> • IMMERSIVE CLASROOM • ON DISTANCE COMMUNICATION TECHNOLOGY • CAMCORDERS • VIDEO MAPPING PROJECTON

Figure 7. Grammar Of Directions scheme

To differentiate the types of intervention needed, 3 groups of elements and components, physical and virtual, with a significantly different impact were outlined:

- **Building:** The framework of the space consists of systems and surfaces to better support any activity to be performed in the classroom
- **Furniture:** The furnishing components with high flexibility to allow a quick recomposition of the layout according to teaching needs
- **Technology:** Everything that includes the virtual appearance and digital devices to amplify the teaching experience

The 3 groups of elements contain all the supporting components necessary to allow an effective teaching path. However, as verified in the previous paragraph, since the space has to support different types of activities in addition to the common ones, it is necessary to make changes through an implementation and installation of resources. To raise the physical space of the teaching from a basic conformation to a more advanced level, 3 different degrees of completeness have been defined:

- **Base:** the starting level that includes all the elements in order to guarantee a basic support to the conduct of a canonical lesson that includes moments of exchange between professor and students (lectures, feedback sessions, seminars) and *peer-to-peer* activities to be carried out in groups. The furniture must be chosen according to the regulation and the system must allow the soundproofing, the darkening of the classroom and a digital apparatus able to allow the simple execution of audio/visual material and a high-performance wi-fi connection
- **Intermediate:** the changes made to the class are all performative, adding a higher degree of flexibility to allow a quick reconfiguration of the classroom. The furnishings chosen, as movable, modular and writable elements, are flanked by a more permissive technological baggage with the inclusion of smart boards, cloud platforms and multiple projections

- **Advanced:** in order to diversify a single space according to the different specific needs of each course, it is necessary to reach an even greater degree of optimization and improvement than the previous one. To allow the execution of some extra activities (such as the catwalk for fashion or exhibit shows) it is necessary to think of a flexible storage in order to store the furniture and completely free the environment and to add a system of mobile walls in order to widen the space. The furnishings themselves must be comfortable but able to fold in order to be easily moved and stored while the digital devices must allow a very high degree of immersion thanks to the installation of multi-cameras able to alter the perception of space and enhance the teaching/learning experience

The use of this grammar, which arises from the basic needs related to the behaviors found in the learning spaces, is useful for planning a laboratory environment that can gradually be implemented. Understanding the needs in common and the individual requirements helps to establish a hierarchy of interventions to be planned immediately to prevent the space becoming unable to support the teaching of the present and the future.

Conclusion

The results obtained until now show how it is possible to think of an evolution of the teaching space in which analogical and digital, physical and intangible aspects contribute to improving the relationships between the different actors involved in the teaching process.

The context in which the application was tested, the School of Design of the Milan Polytechnic, involves some specificities that better help to understand what has been done and the reasons that have defined the main directions of the project.

There are three characteristics of the School that most influence the choices of the project:

- the average number of classes, which foresee for the laboratories the attendance of about 60 students.
- the current facilities of the design campus, within which there is a dedicated system of extremely consolidated and efficient laboratories, a satisfactory quality of seminar rooms and well-structured frontal classrooms;
- the polytechnic approach that characterizes School and presence of degree courses of different design disciplines (for the bachelor level: product, interior, fashion and communication design).

These three assumptions have oriented the design choices towards solutions of medium / large size spaces, characterized by a flexible approach that increases on one hand the interaction with the students (student presentations, projects development / revisions / collaborative feedback session, public presentation, prototype show / exhibit and media show are the parameters most often considered in the interviews to the Degree Course Coordinators) and on the other hand the need to find a minimum common

denominator to satisfy the specifics of the different degree courses, noting however that from a solid world characterized from "disciplinary boxes" (Manzini, 2004) we moved to a fluid reality, in which the boxes were opened, making it impossible to identify disciplinary boundaries, but where the distinction is made through the identification of the core of knowledge.

The design of a transversal space used by the different degree courses can therefore lead to a cross fertilization that stimulates the student and the teacher through a vertical flexibility, in which during the same course you can experiment with different solutions depending on the type of Knowledge Transfer Activities or a horizontal flexibility, imagining a contamination between different knowledge.

The research described here is a point of arrival regarding the identification of the needs of the different degree courses followed by a prototyping phase to verify possible spatial and technological solutions that can allow to reach a high level educational impact.

A unique flexible space, in terms of temporality and personalization, that can be modeled and adapted to ever-changing new needs.

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Professional Papers

The Global Design Studio (GDS): Playing with Trans-National Digital Design Education

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Abstract

The Global Design Studio (GDS) is an online intensive project that introduces students and staff to transnational and transdisciplinary practices and collaboration situated in pluralistic and global ways of designing together whilst exploring subject-driven opportunities for online learning. The project grew out of INTERACT, an academic and student exchange project between four major institutions in Europe and Australia that explored the futures of design in a global context. The GDS distils the key benefits of INTERACT into a formula that could be scaled to include a greater number of students without the monetary and environmental expense of a physical exchange, making the learning experience more inclusive and accessible. Simultaneously, GDS exposes new, subject-driven opportunities in building global networks for online learning beyond the usual rationale of resource expediency. This paper will report on the first iteration of the GDS project and propose valuable next steps. Furthermore, the structure of GDS is flexible and adaptable and can be re-created across different institutions, times and contexts – and we would value the opportunity to create further connections around a campfire in Rovaniemi!

Author keywords

Global Design Studio; subject driven; transnational; distributed working.

Introduction

The first iteration of the Global Design Studio (GDS) was a ten-day intensive co-design workshop involving undergraduate design students from three major institutions: The Royal Melbourne Institute of Technology (RMIT), the Danish School of Media and Journalism (DMJX) and the London College of Communication, University Arts London (LCC). Twenty students from each institution participated in a brief based around notions of ‘Playable Cities’ explored later.

The project evolved from a four-year European funded exchange program between the institutions called INTERACT (full title: INTERACTive Studios & Innovative Networks for Future Design Careers) which had proven to be a productive catalyst for each institution to challenge its approaches to the design subject and teaching methods as well as exposing participants to broader global contexts for design. During these four years, forty student and twenty staff exchanges were made between the European and Australian institutions, the student exchange usually lasting 10 weeks. However, the prohibitive cost and logistics excluded many from participation. (Revell & Verhoeven, 2018)

INTERACT was also conceived of in a climate of increased emphasis on online and/or blended learning approaches from the institutions involved, largely justified as an economic expediency. The Global Design Studio was therefore an opportunity to explore a subject-driven approach to online learning that continued the objectives of INTERACT to provide students with a cross-cultural learning experience.

GDS proved a great success at sustaining a global community of practice around interaction design between the three institutions founded in the INTERACT project. In this paper we analyse first the context and rationale for the project. Secondly, the preparation and strategic decisions made regarding delivery methods with the constraints of online learning and thirdly the actual delivery and feedback from the process. Much of this feedback is a reflection on extensive student feedback gathered at the end of the project. The hope is that this provides a model for future projects of a similar nature and provides rationale for further subject-driven collaborative online projects that cross boundaries and time zones.

Context

INTERACT was a unique project in its scale, scope and ambition. The objectives of the program were to ‘link coursework, studio practice and work integrated learning (in a cross-cultural setting) to develop better graduate outcomes for future practitioners in the field of Interaction Design.’ (Interact Mobility Project, n.d.) It was rooted in the belief that intercultural exchanges and experiences have a clear benefit to students ‘as it prepares them to live and work in the global businesses and the highly mobile social groups that are emerging.’ (Beetham, H. et al, 2013, 266).

In the current global context of growing anti-globalism and anti-intellectualism as well as changing work and living patterns, INTERACT became an experiment

to see if a common language of design could be used as a platform for the resilience of design through emerging platforms and forms of digital practice. When it ended in 2017, it became even more important to maintain aspects of global and transnational education.

INTERACT experimented with how 'the growth of digital tools for collaboration are enabled by and enable globalised design practice and more precarious working habits.' (Revell & Verhoeven, 2018) Participants organised through platforms like Trello, communicated through Slack and Skype and posted their experiences to Google groups and blogs. However, these were only pursued as methods of enhancing and supporting physical exchange rather than standalone tools for practice and learning.

The Global Design Studio also sought to address a second ambition beyond a more affordable model of international collaboration; demonstrating a subject-orientated approach to online learning. It is obvious that with deepening geo-political divides, particularly in the UK, and the increasing cost of education to students that there is an operational drive toward online delivery as an economic expedient to cover costs. However, online delivery has proven divisive and difficult to educators sometimes due to technical and resourcing issues but also because 'large number of faculty and staff think that online courses are less prestigious than face-to-face ones.' (Moreira, 2016)

Though online delivery is common in some subject areas, the move to online or distance learning in design education is particularly harsh as the value of the studio run parallel to the nature of the subject (Crowther, 2013). The challenge of Global Design Studio was to experiment in a model of online learning that actively enhanced the subject of design and the studio model from a subject perspective and provided added intellectual and creative value to academics and students instead of simply presenting an economic imperative. In this way, online learning was used to promote the experience of activity between 'the mix of individuals in... social networks, such as chat rooms, digital cafés, blogs, and discussions groups, broadening the range of new social mixtures and cyber-experience into different groups in relation to education, culture, rationality, learning styles, age, races, nationalities, expectations, and demands.' (Moreira, 2016) As identified in our previous paper (Revell & Verhoeven, 2018), this broad experience of different working patterns, ideas, individuals and approaches is difficult for students to experience from the studio without the prohibitive expense of exchange or time in industry. As such, GDS is a synthesis of the initial brief of INTERACT to broaden the cultural, professional and global experience of design students and to explore how this particular online collaboration might be used as a model of how online activities can be used to enhance and add to the experience of contemporary design education rather than a reductive measure of efficiency.

Overall, the studio had the following objectives:

1. Trial a globally collaborative brief between design students across the world.
2. Develop ways of allowing students and staff to experience the practice of their subject in a global context without the prohibitive cost of physical exchange.

3. Demonstrate and experiment in a subject-driven approach to online learning that enhances the quality of the student experience and subject.
4. Build students and staff digital skill set, using tools that are commonly used for distributed working in design focused workplaces beyond the university context.

Preparation & Delivery

The idea of an online collaborative brief was stipulated early in the evaluative period of the INTERACT programme but took a long time to organise between the stakeholders. During initial meetings about the online collaboration we agreed on specific parameters within which the project was going to take place: We agreed on one joint design project brief which would be delivered synchronously and asynchronously to give students and staff from the different institutions a common goal. We also agreed that any online learning experience in a design context required an approach to *learning by doing* (Schön, 1985) and a focus on the process of making and thinking through design in a collaborative context (following recommendation for effective online design studios by Ouita Broadfoot and Rick Bennett).

Working with the Curriculum

There were significant logistical curricular challenges that had to be overcome without the support of existing frameworks for this type of activity. In this process there were institutional differences exposed such as how a project like the Global Design Studio is articulated to students in their learning. At the London College of Communication which, as previously identified (Revell & Verhoeven, 2018), favours a student-driven atelier-style model at a large scale, students undertake regular extra-curricular projects so there was no need to make it fit the curriculum or course structure to encourage participation. The Danish School of Media and Journalism, with a much smaller student body found it easy to manoeuvre the project into coursework while the Royal Melbourne Institute of Technology had to write a specific unit option integrating the project. Finding good timing in the rhythm of the curriculum and acknowledging how student expectations change between institutions provided further points of discussion between academic teams about the value of these projects.

We therefore purposefully kept the framework flexible and open so that the different institutions could approach this in ways that suited their curriculum design and course culture.

Working with ModUAL and Playable City

At the stakeholder meeting it became clear that none of the courses involved had any experience with this kind of ambitious, subject-driven transnational project delivery, while ModUAL had ample experience in running digital collaborative workshops. ModUAL is a UAL initiative led by Fred Deakin with the aim 'to find new ways of prepar[ing] students for a meaningful career in today's creative industries.' (Deakin, 2016) It responds to 'ongoing disruption' as a

condition of our ‘post-digital culture’ (*ibid*) and uses iterative and agile working practices from industry and applies these in an HE context.

For the GDS this involved a limited and well-structured timeframe into which synchronous and asynchronous moments of working together in different groups sizes were scheduled. Meetings took place using Fuze, a platform for digital collaboration that connects voice, video, messaging and content sharing and Slack a cloud-based messaging platform. Synchronous workshops using Fuze ran every day for three hours at different times to adjust to the different time zones. Slack was used for the asynchronous moments when smaller teams were working together remotely on the same project.

For the Global Design Studio, we also involved Playable City, an international creative project putting ‘people and play at the heart of the future city, re-using city infrastructure and re-appropriating smart city technologies to create connections.’ (playablecity.com) This became the joint brief. Students were sub grouped across the three institutions and worked towards creating: ‘interaction[s] and creative installations... to unlock a social dialogue... – one which will vary in each location’ (playablecity.com), collaboratively exploring intellectual ideas around the city in a global context and designing urban experiences in the form of video prototypes together.

From the 3rd of December to the 11th of December 2018, 60 students from three different institutions met daily between 9am - 12pm London time (UCT) to run through short design exercises by the ModUAL team, discussion and feedback. These were hosted by ‘pod leaders’ who steered the sessions to productive ends so that the participants could drive the project forward asynchronously in the remaining time. In the final few days, the participants focussed on the development and delivery of their video prototype for the final crit.

Evaluation

Our evaluation is drawn largely from the thorough student feedback gathered throughout the project. These have been broken into sections reflecting the questions asked; engagement and participation and online productivity. There is some obvious cross-over between these but this breakdown provides a useful framework for assessing this and future projects. Finally, we offer reflections on the original aims from the perspective of the authors.

For most students involved this was a first experience in online collaborative working. The project received overwhelmingly positive feedback in line with studies that have ‘found that the majority of students irrespectively of their residence feel that learning alongside students from other countries has a positive influence.’ (Kayumova & Sadykova, 2016) However, here we have chosen to analyse specific criticisms that provide insight into the problems and opportunities of this kind of project.

Engagement and Participation

Students were positive about the exposure to new tutors from other institutions and the opportunity to discover new methods, techniques and disciplinary

definitions. This fits neatly with a pedagogic approach the values student's self-direction in seeking feedback, evaluating in relation to their aims and then responding. As we identified in the previous paper (Revell & Verhoeven, 2018) working with the same cohort and group of tutors can stifle the development of a subject as well as individual students. Exposure to a greater range of peers and collaborators is an obvious incentive for this kind of work and reflects the experience of contemporary practice.

However, unexpected feedback included difficulty in stimulating consistent engagement in online sessions. Students admitted to being easily distracted or struggling to concentrate 'due to the fact that you are looking at a screen, and listening to a screen - there's less personal involvement to keep you hooked on whoever's talking.' During the initial briefing session, the video was 'choppy' and the images 'low quality' and a lot of students admitted losing interest: 'Something about the way [the lecturer] presented... made the experience seem a little frustrating at times.' It's clear that tutors will need to consider visual engagement and stimulation when working exclusively with the screen.

As the brief progressed, attendance and participation began to lag and this had a detrimental effect on the remaining students: 'There weren't enough consequences for the students who chose not to show up or participate in the work.' This comment rings true of all extra-curricular projects but students also suggested how this absence was more notable in an online context when working with new collaborators.

Following this problem, a surprising response was a frustration with online etiquette where students bring their own expectations and experience of online behaviour which resulted in a handful of clashes when online behavioural etiquette failed to match:

It might be useful to set a tone for how and when we use the camera. and why. I don't think the people, turning it off, gets why it's nice to look at who you are communicating with. most people got it down, but definately [sic] not all.

A team learning together would quickly establish an etiquette as most GDS participants did. However, when a group is pulled together for a pop-up event like this it may be useful for organisers to lay down behavioural ground rules. Many students fed back that the use of Pecha Kucha style introductions was a very effective way of getting participants comfortable to speaking with each other. This could also be used for laying out expected behaviours.

Working globally also introduced some other forms of culture clash. For example, students from one of the institutions were very vocal about the fact that 'we had to work through the weekend as well.' This stands in contrast to the expectations of students at other institutions, used to working flexibly: 'The fact that you expected us to work during the weekend I find disrespectful.' This has implications for how regional differences in design culture have an impact on the operation of these kind of global projects.

Online Productivity

The expected complaint about the lack of physical presence when doing group work forms a consistent bed of critique with the online delivery of creative subjects: 'I was missing ... the immediacy of sketching out ideas and bringing everything to paper straight away. Working exclusively online took away a lot of that.' Some read this as a stimulating challenge while some found it to have a negative impact: 'Working exclusively online has unfortunately taken away a lot of positive experiences that I have encountered before, doing other creative workshops. Being together with people in the same space, you get to know them a lot better.' This response is unavoidable so it's important to counterbalance with the positive aspects of this kind of work. However, the vast majority of responses point to having these expectations defied; 'I didn't expect a fully digital workshop to work nearly as well as it did!' And many celebrated the enhanced opportunity provided; 'The fact that we were able to make such incredible concepts and products, across the globe using webcams, microphones and screen-sharing is amazing.'

Many positively connected the experience with expectations of their own practice: '[T]his has given me the confidence to pursue more of this in the form of personal projects' and suggesting that 'learn[ing] about [and] finding [the] most fun and efficient way of working in this remote worldwide creative collaboration that could be applied here or anywhere else life' was valuable. Organisers should make sure to highlight that this is a different type of experience to classroom learning which provides a new set of skills and methods for working in a different way and augments, rather than replaces, studio work.

The project also brought new challenges around building strong working partnerships. This was the result of a combination of distance learning and the short time span with many commenting that they would have 'prefer[ed] being in the same room for most parts of the project.' 'I really missed ... all the physical things. That for me is a large part of coming to a great idea and helps to stay on the same page with the rest of the team.' Here students identified some aspects of online working as a block to productive collaboration: 'A bit hard to brainstorm online vs. together in a room.'

However, some highlighted how the constraints of time and online learning brought new focus to a project and consequently encouraged them to work at a different rhythm and 'really improved the focus of our end product - and it cut our long-winded discussions to a snappy close in minutes.' Some disagreed and somewhat predictably expressed concern that the tight timing of the project was counter-productive: 'It seemed like it was not enough time to discover the ideas in the groups, and that the time given to introduction didn't make sense in relation to the time given to execution.' Although this is to be expected of any short project, there is a particular missed opportunity highlighted by another comment: '[With more time it] would've just been great to see the ideas of other pods, maybe share the overall ideas in one document of the info channel.' Time was built in to share the outcomes but not until the end of the project. A slower pace might allow more time for periodic sharing, socialising and critique which is one of the key value propositions of a global project.

Author's reflection

A core ambition of INTERACT and Global Design Studio was to give the opportunity for students and staff to explore global design cultures. Barring the handful of examples suggested above, working between the UK, Australia and Denmark is a relatively limited frame of reference for design cultures. With the success of this project we will be engaged in exploring similar models for collaboration with much more diverse cultures in emerging global design scenes. This responds to a deeper practitioner and institutional responsibility to connect and provide opportunities for emerging design scenes in parts of the world so far excluded from the global design network.

Many of the comments from students draw on a struggle to contextualise the project with the rest of their studies. Though for the majority it was enjoyable and productive it remains unclear how they will assimilate it into their sense of practice. In future work we would do more to embed this type of project in the learning journey and curriculum so that 'online international learning is successful when activities are carefully designed in alignment with precise internationalized learning outcomes.' (Kayumova & Sadykova, 2016)

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Actively reflective: understanding the drivers and hurdles of building knowledge bridges between theory and practice in design education.

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Abstract

This paper deals with the theory-practice gap in design teaching and builds on observations gathered during teaching experiences of courses in the realms of design research, scientific writing and design practice. Experience has shown that students perceive input given in these courses as separate entities. The challenge was identified on how to structure design education to make students realize the benefits a combination of the inputs of these areas bring in their projects. Reflections on a course hold are presented, where 23 students were instructed to use an approach of combining the field of research and practice by using a human-centred process and methods guide script as well as a documentation template to support their training of reflective and lateral thinking skills in their practical design projects. This course served as a preliminary study for further surveys within this area of research.

Author keywords

design education; theory-practice gap; cross-disciplinary; design process; lateral thinking.

Introduction

The curriculum of a bachelor program in design is packed with a variety of courses to equip students with skills and knowledge in order to be able to navigate through the design process and deal with its complex tasks. To prepare students for further study programs of a master or even a PhD program and of course for their professional careers, it is essential to establish an awareness and understanding of the necessity of an active knowledge bridge between theoretical input and practical doing during their bachelor studies. Although this knowledge bridge is instructed in all terms, in the last term, for the practical bachelor project, it is a requirement that students prove their ability to establish this knowledge bridge on their own. Experience has shown that in practice, students perceive input given in different courses as separate entities and that they don't apply the instructed work methodology of one course to another.

Observations made during a bachelor-project kick-off session, where students were asked first to sketch the design process, they would apply to their project, illustrates this hurdle. The results were overall good and provide a general understanding of the design process phases. The confirmation of the learning outcome due to the promising overall results about the awareness of the iterative structure of a design process, was slightly dampened after the first task in the project work, the conduct of a photo study of their project's context. The results presented were extensive and detailed, but when asked to derive concrete problem areas respectively research questions out of it, first obstacles occurred. The same effect had been observed in design research or scientific writing courses, when the task of generating concrete research questions based on the results of a user study or a comparative literature survey on a topic was set. Taking courses individually, the given instructions and training led generally to good results. But nevertheless difficulties were observed when they had to prove their combined skills in their last term.

This observation led to the question: how can the instructed input and the training be rearranged to improve the abilities of establishing active learning and knowledge bridges between courses? Due to the complexity of today's design profession also design education operates in ever-more-finely defined disciplines. But now, as design educators, we face the challenge of teaching students to combine their skills and train their ability in lateral thinking, or to be actively reflective.

Donald Norman (2010) points in his paper *The Research-Practice Gap: The Need for Translational Developers* to the fact that "[t]he skills sets that make for a creative, insightful researcher are very different from the skills required of development engineers to make something work reliably [...]." (ibid., p. 10) He continues by arguing that "[w]e know surprisingly little about how to do design. There is no science of the practice in the same sense that there is a science to the structural analysis of buildings and bridges [...]. We do not know the best way to design something. The real problem is that we believe we do." (ibid., p. 10) He states, that science follows the structures of hypotheses, conclusions, and evidence and that in practice much reliance is given to best practice examples. Norman illustrates Donald Stokes's approach of the use-inspired basic research depicted in his book *Pasteur's Quadrant*, which means to start with a real problem, do scientific research on it and use the gained knowledge

to solve the identified problem (Stokes, 1997; cited in: Norman, 2010, p. 11). Donald Norman concludes, that for him a third discipline between research and practice has to be inserted, the translational development. This discipline could build a bridge from the abstractions of research to the practicalities of practice. He sees the task of this discipline in acting as intermediary and translate research findings into the language of practical development as well as business issues. (*ibid.*, p. 12)

In the light of this precondition, the question was posed on how to structure design education to offer students a transparent overview of a holistic, as well as human-centred, design process. This paper aims to contribute to this discussion by presenting reflections on a course hold, where 23 students were instructed to use an approach of combining the field of research and practice and had to use a prepared human-centred process and methods guide script to support their training of reflective and lateral thinking skills in their practical design projects. This course was designed to make the habits of inquiry-based learning an essential part of student design practice. It was intended to provide space for research as well as to show possibilities for reflecting on one's own course of action and thus to gradually enable competence development for dealing with contemporary issues. The aim was not to carry out a concrete evaluation of the course itself. On the one hand, the goal was set to test the created guideline on the use of the design teaching. On the other hand, the goal was to generate concrete indications for further analysis and evaluation in the following semesters. This course served as a preliminary study for further surveys within this area.

Course preparations

This section offers information on how the human-centred process and methods guide script, which had been prepared for the students, came about. The starting point for this approach built the work presented in the paper *Putting Theory to Practice: Reflexions on the Integration of Product Design Aspects in AAL Projects* (Dittenberger, 2018) on refinements to the ISO 9241-210 standard about product design aspects.

The choice to use this work as a basis for the defined design education challenge was made because the presented input deals with the task of bringing together experts from various fields and to join efforts in the creation of human-centred design and technology. The need for cooperation strategies is supported by Gerhard Heufler (2016), from the field of industrial design, who proclaims that in the future, design needs to intensify the work with experts from different professional disciplines to be able to face the increasing complexity of the design challenges ahead. He sees a necessity for the application of new methods of cooperation across disciplines to give rise to new innovative product solutions. But unfortunately, Heufler offered no hint of how the cooperation of different disciplines on a design project, with regards to a united process methodology, could look like.

Furthermore, students should not only be trained in establishing cooperations with other disciplines and with this in their lateral thinking skills, but also to

learn to use a human-centred focus for the development of their project approaches already during their bachelor studies.

From a human-centred point of view, today's fast technological development offers many benefits, but bears also a wide range of possible obstacles. The steady technological advancements, and the fact that almost every product today is to some degree intelligent, emphasize the precondition that a set of multiple disciplines, from the field of research, design and engineering, are needed for the creation of design for the 21st century. But in the future, design will no longer be controlled by what suddenly becomes possible through technological development, but by issues of use. The design process itself gets more and more shaped by the qualities of openness and variance. So design becomes also a communicative process. It is no longer characterized by the sheer capacity for innovative form-finding, but by the ability to ask the right questions.

Starting Point

The paper mentioned focusing on an observation, gathered during the work on research projects in the realm of the Active and Assisted Living (AAL) Joint Programme (AAL Programme: Active and Assisted Living Programme, ICT for ageing well, 2019), concerning the representation and integration of product design aspects and parameters in the project development process. Partners from industry, research and user organizations collaborate in the realization of funding projects in this programme.

For this reason, also a combination of different disciplines, like technical engineering, system architecture, user research and product design work together for the success of these projects. Normally, each of these disciplines applies their own project development process methodology in their work. But when people of different fields of expertise work together on a research project like this, the selection and definition of an overall process methodology are essential to reach the defined project goals.

The ISO 9241-210:2010: Human-centred design for interactive systems standard (International Organization for Standardization, 2019) is used most often in AAL projects as a process management and requirements engineering tool for the creation of computer-based interactive products and systems.

Starting after the identification of the need for the application of a human-centred design process for the development of a product, the iterative process is characterized by four main phases (Figure 1).

Phase 1 is intended to understand and specify the context of use of the project. Technical as well as user requirements are collected in this phase. In phase 2, the collected technical and user requirements get listed and personas, use-cases as well as scenarios are developed. During phase 3 design concepts and prototypes are created in order to evaluate them in phase 4 against the collected requirements of phase 2. In an iterative manner, the phases get repeated till the evaluation results show the desired overall outcome of the project.

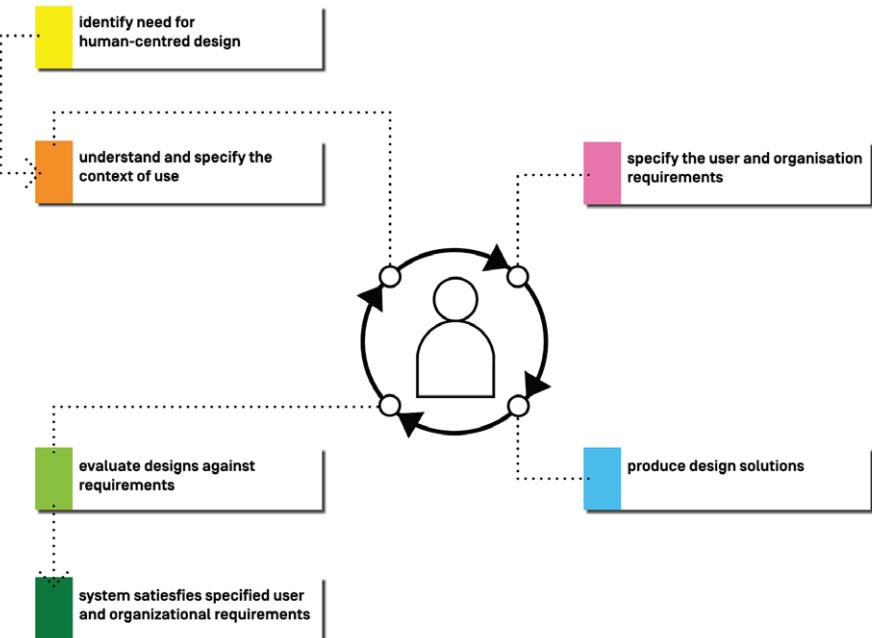


Figure 1. ISO 9241-210:2010 Standard - Human-centred design process methodology (own representation based on International Organization for Standardization, 2019).

Over the years, the focus of the challenge-led calls of the AAL programme has evolved from funding research on computer-based interactive systems to market-oriented ICT-products. But the observation was made that hardware design aspects are to date not as well integrated and applied in projects' everyday working practice as the realms of usability engineering, user experience design and user interface design already are.

This observation led to the question which kind of refinements the applied human-centred design's ISO standard concerning the representation of the involved product design aspects would need to increase the awareness of the whole project development team and harmonize through this the daily project work.

From this fact, the question arose which kind of process methodology, uniting the work of these disciplines, would be needed, in order to enable a more transparent overview of the tasks ahead and would lead, through this, towards a holistic human-centred design engineering process. There are many varying approaches and methods out there, trying to offer a common thread for each profession. But the development of a product needs a multidisciplinary team. So the need to build bridges between the disciplines, offering a guiding thread, seems obvious.

In pursuit of this aim and in order to learn from the experience of others, process structures applied in the context of user-centred and human-centred design were examined to elaborate specifically the product design aspects within this ISO standard. A revised presentation of this process (Figure 2) was proposed in 2018.

The aim of that work was not to present a new process model for human-centred design in itself, but to raise awareness of the representation of product design aspects in the human-centred design's ISO standard by suggesting refinements for each of its process phases. Practical work experience had shown that for the success of a project, developed by a multi-disciplinary team, a clear and structured overview of the project's development process, a shared understanding of the relevant terminology as well as a shared understanding of the tasks of each process phase is essential.

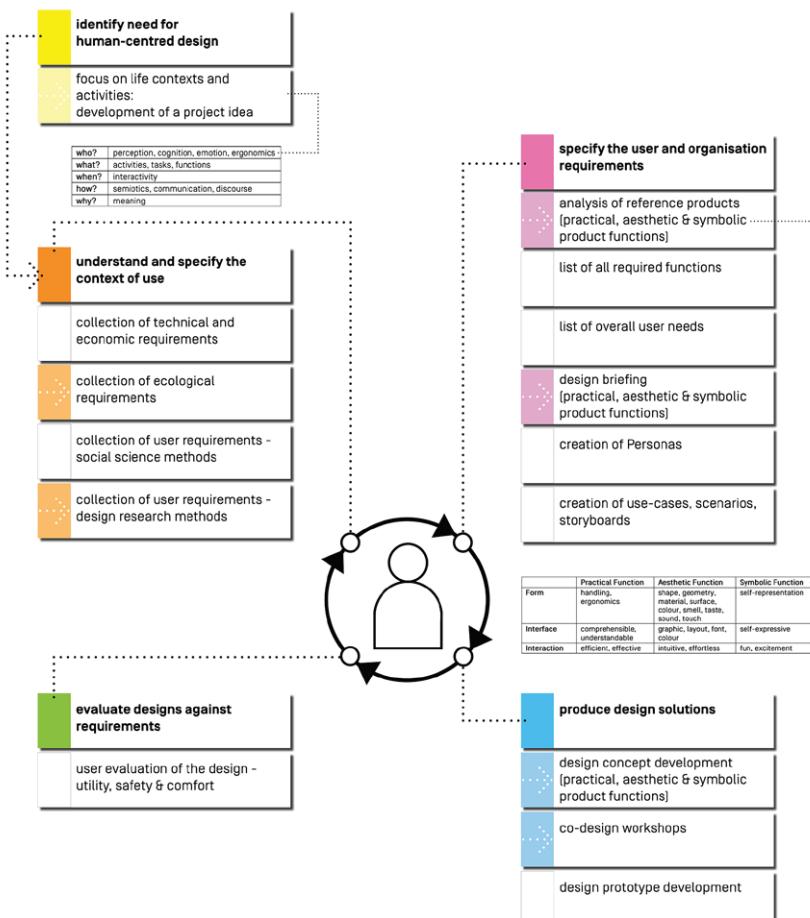


Figure 2. Representation of product design aspects in the human-centred design's ISO standard.

Human-centred process and methods guide script

As a basis for the creation of the human-centred process and methods guide script, the described refinements of the ISO standard was used (Figure 2). This process presentation is not intended to serve as a general user manual, but as a guide to navigating through a complex process. In order to use it for design education the work was revised and is now divided into the phases *Inspire*, *Collect*, *Design* and *Evaluate* (Figure 3).

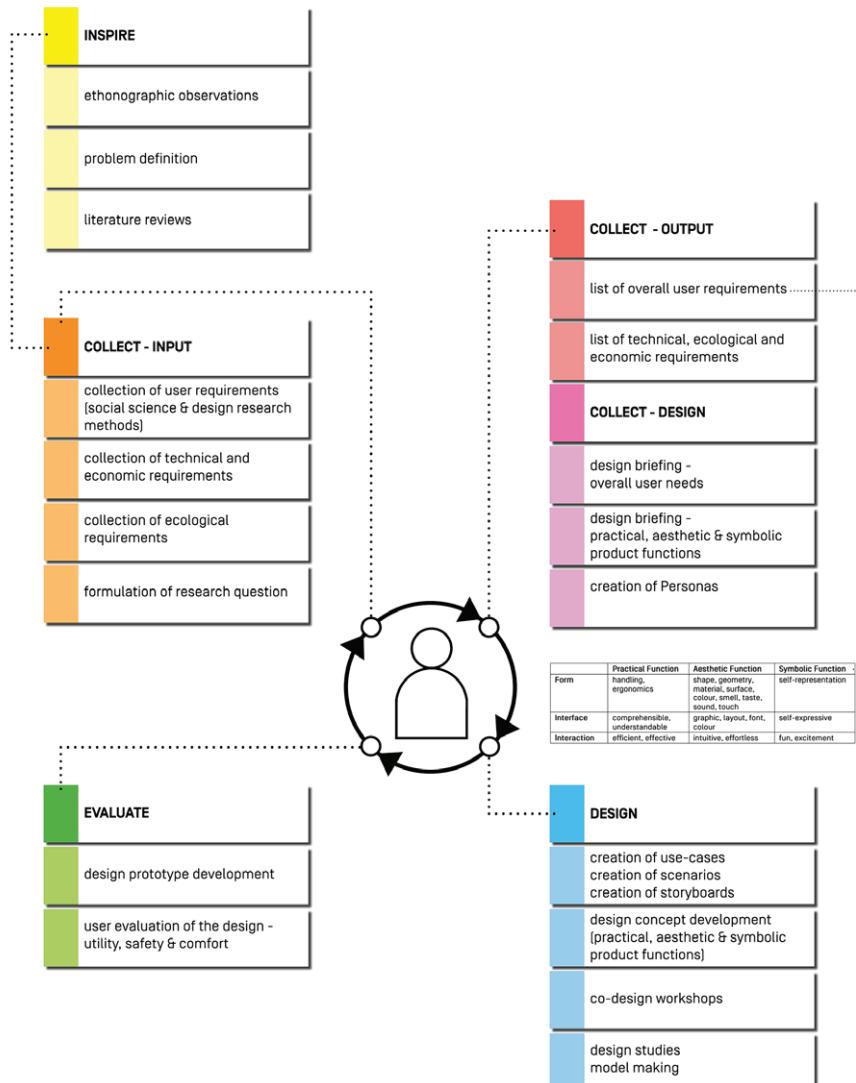


Figure 3. Visualization of the Human-centred design process used for the script.

Furthermore, in the design of the script, reference to the existing literature was bridged between theory and practice, in particular the research strategy of practice-based design research (Candy, 2006; Candy, 2018). Although the literature provides information about the process to be used, unfortunately there are few possibilities or methods described that could be used to inform the individual process steps. Especially for bachelor students this information would be needed.

So, being well aware that there is an abundance of literature available concerning design process structures and possible methods to be applied along the way, teaching experience has taught the lesson that too much of a good thing can also lead to confusion. Under consideration of training the active, reflective skills of students and to strengthen the knowledge bridge between theory, design research and design practice, the goal was defined to filter out appropriate material which would support this task. The results of this task were summarized in a script. Each individual process step was explained in terms of its content and objective. Furthermore, important text passages from various literature sources and a selection of methods of design research and design practice that can be used during project processing were presented. For better understanding, the methods were again subdivided according to their suitability as input collection and output analysis methods for each of the process steps. Gained experience of teaching practice has proven that this additional distinction is important for working on a design project. Students often had difficulties implementing design methods and research methods because they saw themselves confronted with a wealth of collected material and did not see a common thread helping them to sort, filter and then analyze the collected data in a single process step.

The students' projects had to follow a qualitative research approach to answer their research question. The qualitative research process is oriented towards the understanding of the humanities and cultural sciences and regards the subject as the constructor of his reality. Already during the research process results are put into practice theories and hypotheses are generated. Flick (2009) describes the research process in non-standardized qualitative research through the steps of selecting a research problem, systematic literature analysis, formulation of the problem, development of a project plan, selection of appropriate methods, entry into the field of investigation, data collection (data documentation and data analysis) and discussion the results (*ibid.*, p. 76).

For the study design the approach of action research, which can be understood as comparative research, was chosen. Here, the focus is on research into the conditions and effects of social action as well as the reflected action within a design process. Although the course of an action research process depends strongly on the practical conditions, there are two steps that must be considered. According to Muratovski (2016), first a goal or a research question is formulated, followed by an action which is subsequently evaluated. The process is characterized mainly by the constant change and the repetition of information collection, analysis and processing. In several iterations, preliminary results are already being implemented and tested during the research process. Another criterion of action research is the equality of all involved, which is ensured by the constant exchange between researchers and persons of the target group. (*ibid.*, p. 190-201)

The process step *Inspire* includes the promotion of one's own creative potential, as well as the exchange of experience and information in the form of teamwork and knowledge networking with non-industry knowledge areas. The perception of current issues in our society also falls into this phase of the process and addresses the anthropological awareness of people, society and context, in particular by human values, needs, emotions and behavioral patterns. Methods of qualitative social research, such as observational studies are used here. Methods were also presented to structure, filter and analyze the results of this phase. Based on the results of these studies, problem areas within the project context are to be shown. The identified problem areas are then researched comparatively in the literature. Table 1 offers an overview of the literature input and the methods chosen for this process phase.

Inspire	Methods	Source
Theory input Input methods	Literature – Research Essentials	Muratovski, 2016
	Ethnography	Milton & Rodgers, 2013
	A day in the life	Milton & Rodgers, 2013
	Photo and video diaries	Milton & Rodgers, 2013
	Competitor product analysis	Milton & Rodgers, 2013
	Product autopsy	Milton & Rodgers, 2013
Output methods	AEIOU – Activities, Environments, Interactions, Objects, Users Framework	Martin & Hannington, 2012
	Problem definition	Boeijen [Ed.] (2013)
	Literature reviews	Milton & Rodgers, 2013

Table 1. Literature, input and output methods for the design process phase *Inspire*.

In the process step *Collect* ethnographic research methods, such as survey methods, and design research methods are used. The collected material is then evaluated and interpreted. The aim is to make a concrete formulation of a research question that underlies the further practical design work.

The results of the phase *Collect* will afterwards, in the intermediary phase *Collect – Design*, be transferred into a list of requirements concerning all required product functions and the overall user needs to get later on translated into a design brief. The design brief lists the requirements related to the technical, aesthetic and symbolic functions to be addressed in the project. Furthermore,

based on the results of the previous phases of the process, archetypal users, Personas, are defined for the project in order to ensure the focus on the target group of the product to be developed. Table 2 offers an overview of the literature input and the methods chosen for this process phase.

Collect	Methods	Source
Theory input Input methods	Literature – Qualitative Procedures	Creswell, 2009
	Interviews	Boeijen [Ed.] (2013)
	Questionnaires	Boeijen [Ed.] (2013)
	Cultural probes	Boeijen [Ed.] (2013)
	Focus groups	Boeijen [Ed.] (2013)
Output methods	List of requirements	Boeijen [Ed.] (2013)
	Ecodesign checklist	Boeijen [Ed.] (2013)
	Symbolic meaning, and its link to design for happiness	Jimenez, Pohlmeier & Desmet, 2015
	Personas	Boeijen [Ed.] (2013)

Table 2. Literature, input and output methods for the design process phase *Collect*.

The phase *Design*, as a result, devotes itself to the development of design approaches, design studies and model making. This process step also includes the creative incorporation of feedback from potential users of the developed product, service or process. Table 3 offers an overview of the literature input and the methods chosen for this process phase.

Design	Methods	Source
Theory input Input methods	Research for designers: a guide to methods and practice.	Muratovski, 2016
	Storyboards	Martin & Hannington, 2012
	Sketching	Milton & Rodgers, 2013

Design	Methods	Source
	Paper prototyping	Milton & Rodgers, 2013
	Co-Design	Sanders & Stappers, 2012
	Appearance models	Milton & Rodgers, 2013

Table 3. Literature, input and output methods for the design process phase *Design*.

After a final inclusion of the feedback of the future users of the developed design, the phase *Evaluate* represents the last step of the process. Before the prototype is built, the final product design model is evaluated by persons of the target group. In an iterative approach, the process is repeated until the evaluation results, persuade future users of the developed product. Table 4 offers an overview of the literature input and the methods chosen for this process phase.

Evaluate	Methods	Source
	Matrix evaluation	Milton & Rodgers, 2013
	User trials	Milton & Rodgers, 2013
	Semantic differential	Muratovski, 2016
	The Geneva Emotion Wheel.	Université de Genève (2018)
	Technical Documentation	Boeijen [Ed.] (2013)

Table 4. Methods for the design process phase *Evaluate*.

Description of the course setup

Next to the human-centred design process and methods guide script, where students received information concerning methods to apply for the preparation of the design project, a project documentation template was created. The goal of this template was to visualize the combination of the learned methodologies from the theory, research and practice courses and present the design work as a holistic process. In this project documentation, students had to offer information about the problem area and the project's context, the defined research question, the chosen research approach, study design, literature review, applied methods, the applied approach to the analysis of their projects

as well as a discussion of the results with reference to the posed research question.

The structure of the semester followed a common studio principle, starting with a semester kick-off unit, where students were presented with the script and the template with the instruction to use the material for their project work. In the middle of the semester there was an interim presentation and at the end of the semester the final presentations of the work took place. Individual tutorials in product design as well as design research were held on a weekly basis, where students were asked to report on their progress and had the opportunity to ask questions or talk about problems that had occurred.

Discussion

With regards to the posed research question concerning how to establish active learning and knowledge bridges between theory and practice courses as well as how the instructed input could be rearranged and structured, several interesting results could be identified. In particular, this course, as a preliminary study to further analysis, should provide insight into how a detailed overview of all process steps and the methods to be used, presented by the script and the documentation template, supports design teaching during the course of a semester project work with students.

On the one hand, it can be stated that the overview of the holistic process presentation has contributed to a better understanding of the individual learned aspects of theory and practice. The interplay of theory and practice-based courses, such as performing ethnographic observational studies on the process of defining a concrete problem area, the scientific work and building the ability to undertake comparative literature analysis of the identified problem area, and performing ethnographic research methods of detailed information of the people of the target group of the design project, could as a result be better classified. The importance of defining a specific research question underlying the project was also understood. On the other hand, it can be further stated that the use of the script as a basis for the weekly tutorials on the progress of the semester projects has proved helpful.

With regard to the use of the methods proposed for the individual process phases, their implementation, under supervision, certainly worked. However, it was noted that incorporating these extra points influenced the scheduling of the semester projects. The reason for this is considered to be the routine that needs to be set up when dealing with all these aspects. It was also noted that conducting research methods that require direct contact with people in the target group still causes uncertainty among the students. Conducting user studies and responding spontaneously, but safely while, for example, a focus group discussion, needs practice and experience.

However, it has also been shown that understanding a task or process does not guarantee the ability to apply it in practice. For students on a bachelor level the task of designing is in itself still a complex and difficult one. During the semester, and with reference to the bridge between theory and practice, it was observed that some of the students felt easily overwhelmed by the complexity of the task. Students who have a primary emotional, intuitive approach to working on a

design task find connecting it with logical, analytical aspects within a design process to be burdensome. This was particularly evident in the implementation of design research methods, the preparation of comparative literature analyses and, as a result, the subsequent determination of a concrete research question for their respective design project. Along with this, these students also had difficulties in filling in the template of the project documentation.

As stated at the beginning of the paper, contemporary design requires the active collaboration of different disciplines to generate successful design projects. But it's not just about promoting collaboration. The reflection on this preliminary study also raises the question of how the constantly increasing complexity of the tasks within a design process should be conveyed to the students without demotivating or overstraining them. In addition to teaching all the areas of knowledge required to be able to work on a design task, the human being, that is, the students, is always first and foremost in the design of this task for teachers. The mentioned active reflecting, respectively the lateral thinking, should therefore not only be understood with reference to the formation of new knowledge bridges, but also to the learning of the individual reflection of one's own abilities and skills in order to develop these further. Design teachers should support their students also in this task.

Conclusion

As a conclusion of this preliminary study, it is stated that in the future, the ability to combine emotional, intuitive and logical, analytical approaches to a design task should be specifically targeted in design education. The entire script and template for project documentation should help students understand that a holistic design process consists of a combination of these two approaches. As mentioned above, with reference to Donald Norman, different skills are needed as a researcher or practitioner. However, in order to prepare students for the complexity of the task within a holistic design process, it seems essential to develop lateral thinking skills in the course of a bachelor study program. The knowledge gained from this preliminary study will be incorporated in the next step in a revision of the curriculum of theory and practice courses.

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7. The Future of Design Teaching III

Academic Papers

New Media as “Digital Apprentices” to Enhance Learning by Making in Furniture Design Education

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Abstract

This paper analyses three semesters' experience of a 3rd year undergraduate course – Furniture Design Studio (Faculty of Fine Arts and Design of Izmir University of Economics, Turkey) – to reveal the structure and teaching methodology that integrated the use of a wider open source knowledge and new means of digital media to enhance learning by making.

The course's main pedagogical concerns were: (1) to give students a solid methodological base to approach design problems from the understanding of a given brief while considering the relationship objects have with materials, technology, culture and human factors; (2) to have students explore the process of designing and manufacturing furniture as a research exercise and constant learning process on function, material or technology (3) to lead students towards a scientific and critical analysis of the visual inputs and references they may get from the internet, as a commonly preferred source of information, (4) to improve students' ability in describing and narrating their work with the aim of exploring the possibilities of communication and business opportunities to a larger audience by using digital media.

The semesters' structure and work schedule was divided in two main exercises. One as an empirical based study on exploration and interpretation, while the latter is based on transferring the knowledge into their own design process. In the first half of the course, students worked in a reverse engineering exercise. Instructors assigned the students manuals such as *Autoprogettazione* by Enzo Mari from 1974 and *How to Build Modern Furniture* by Mario del Fabbro from 1957 - or collection of furniture pieces from a designer self-producing and crafting his work- Self Productions by Sebastian Erazo 2014/17.

After an analysis supported by online resources such as videos, designer maker videos or digital manuals, which we referred to as “digital apprentices”, students were asked to realize a 1:1 scale prototype of the furniture, which aided them to comprehend the complexity of furniture making process. In the second phase, students were asked to respond to a precise brief, to design and build a working prototype transferring this knowledge. During those three years, it was observed that, the exploratory exercises attained by new media sources were fruitful as methodological tools. Their projects’ outputs and technical solutions were strongly influenced by the solutions experimented in the first half of the semester. Moreover, it was also observed that there was a positive shift from a purely visual and form based search for an idea on mainly from online references, towards a more analytical research considering production, material limitations and technology.

The students' understanding of making a research shifted to seeking for designers or makers that explain how they did something, revealing not only their tricks and techniques of manufacturing but also their design process and approach towards design problems. In that sense, digital apprentices as web based open sources, paired with theoretical background seems to be a valuable ally for future design education.

Author keywords

Crafting; self-producing; open source; design methodology; furniture making; digital habits

Introduction

Having been presented with the opportunity to elaborate the structure of the course ‘Furniture Design Studio’, a joint core course between the Industrial Design program and Interior Architecture Program offered, by the Faculty of Fine Arts and Design of the Izmir University of Economics, the effort was focused on providing students a solid methodology that integrate: furniture design theory as developed in the second half of 20th century, develop students crafting ability and familiarity with carpentry tools and machinery and a critical analysis on the information and visual inputs students get from the internet, and improving their narration skills to share their work.

The course contents were elaborated in order to frame and direct students’ ambition from designing their own “unique” first piece of furniture into a deeper research process in terms of material and technology, state of the art, design brief understanding and object category/history. The hypothesis formulated at the beginning of the course was that this approach would shift students’ attention towards the study of existing objects/methods guiding their curiosity not on the visual aspect of it but mostly towards ‘how and why things are done’ by passing past knowledge without a break in the chain.

This paper describes how, during the last 3 editions (3 semesters) the course was thought out and structured, the experiments and different themes that were assigned to students in order to be able to improve and evaluate students’ outcomes.

We intend by presenting this case to contribute to the discussion of the role of design and designers in the furniture field as a process of research on a given form or object within a very complex market. Moreover we believe that the integration with new digital apprentice methods which are available as open sources on the internet is a very valid contribution towards knowledge.

Theoretical framework

The emergence of design manuals dates back to mid-20th century, coinciding with thoughts that questioned the relationship of design with both the designer and the user. Beginning with the spread of mass production in that period, design evolved into an increasingly independent process, losing a vital connection manual production. Especially products in United States of America were considered superficial and served only a certain rich part of the society. With the increasing consumer culture by the help of the media, the individual abandoned the quest for true happiness, lost the ability to concentrate and keep track of time and it started to be “served” as a customer, without the ability to produce anything for himself. Design manual counteracted against all this upheaval, sharing a common concern to share information about designing and making, towards democratization and divulgation of design and crafts. At the same time, these books tended to educate the user and increase awareness about the products in the market. “How to build your own home” by Ken Isaacs in 1974 aimed to increase awareness of building a home (Prestini, 2013).

In the same period Enzo Mari realized an exhibition in Milan curated by Duchamp center in 1974 named “Proposta per un Autoprogettazione” (Proposal for a self-production) with the intent of opening a debate on the current furniture production to increase awareness in people on crafts and quality in furniture in the market. Mari designed several objects that would, at an affordable prize, allow “anyone” with basic tools and techniques (hammer and nails) to furnish their own house. The models were later gathered in the book “Autoprogettazione” (Self-production) in which Enzo Mari encouraged the user to share with him their experience (Mari, 2002).

“*Proposta per un Autoprogettazione*” is therefore a synthesis that questions the meaning of producing “another chair”. In the current context of over production and in the frame of a furniture design course we can state that designing and producing is an act of personal research, an essay on essential domestic furniture; in other words, as Mari stated several years later in an interview with Finnish company Artek : ‘Design is design only if it can teach something (Artek, 2012). Enzo Mari’s position could be framed in what Brown suggests: these studies stemming from the post-Marxist theory, told different narratives of design history where the act and actor are bound together, which would relate to enhancement in self-development and representation (Brown, 2008).

This attitude towards work, not seen as labour but as self-improvement and evolution is precisely described by Sennet in his book the Crafterman in which he defines Homo Faber as someone that transmits culture through crafts and material culture. The crafter is someone, according to Sennet, who works for the sake of improving his skills and knowledge and he is able to transmit it openly towards the apprentice and universal knowledge. For that reason Sennet

includes also Linux programmers in that category who dedicate and open codes to a wider public for the sake of knowledge (Sennet, 2008).

On that path other manuals emerged after the 1990s aimed at sharing design knowledge and involving the user in the process. DIY (Do It Yourself) culture and amateur makers transformed the understanding of users and makers (Brown, 2008).

Important steps were also taken with open-source projects, the development of 3d printer technologies. In the name of democratization of design, the methods of open-sourcing and sharing information with the first manuals today evolved into digital channels with the emergence of designer-maker culture sharing knowledge via maker videos or online booklets. These steps are important educational tools for design as they transfer both knowledge of making and methodology. In that direction also traditional crafting techniques in the 2000 started make use of digital media in order to divulge their knowledge and increase their audience. Independent designers used and saw the opportunity, thanks to digital media broadcasts channels such as vimeo.com and youtube.com and/or social networks, to act as self-editors of themselves bypassing the conventional way of designing for companies and brands.

For this reason, self-production became a necessary and possible path for emerging designers to access independently the market and gain visibility on international platforms. These design manuals and maker videos worked as tools for gathering design knowledge in the furniture design studio. This way that knowledge is shared and built upon each other. As stated by Manzini, “*Design research* is an activity that aims to produce knowledge useful to those who design: *design knowledge* that designers and non-designers (individuals, communities, institutions, companies) can use in their processes of designing and co-designing”. As he further explains, design knowledge is clear and open to debate, which could be passed on and grow in time. This knowledge should be produced as open and understandable, open to debate by a related person and generates new thoughts to be developed by other designers (Manzini, 2009).

Aims and Methodological Application

The main pedagogical concerns faced in the Furniture Design course presented in this paper could be synthesized as it follows: the first one was to provide students a solid methodological approach (how), secondly providing the students a strong theoretical frame (why), the third was to make them explore manufacturing techniques (make) and the last was to encourage them to narrate their own work and share them to wider audiences (promote).

Firstly, we felt the necessity of providing students a solid and established methodological base that would provide the necessary tools to “start” a project. The given method was based on the work of Munari (Fig.1)

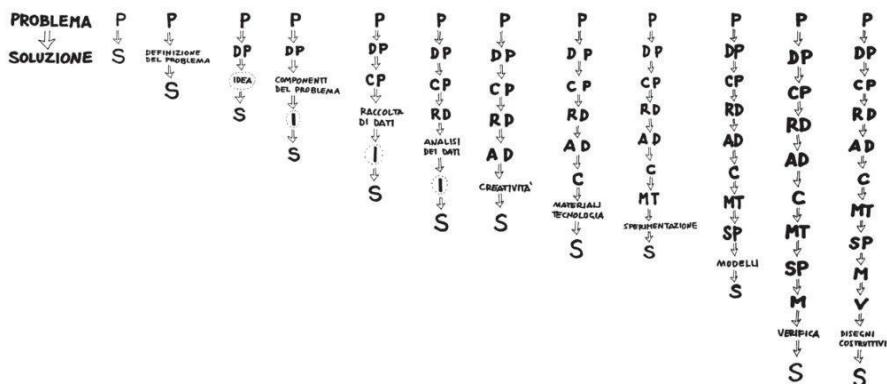


Figure 1. Bruno Munari' methodological notes to reach from a Problem to a Solution as published in the book 'Da cosa nasce cosa' (Munari,1981).

Munari's method follows logical and organized steps that would lead the understanding of a given brief as a 'Design Problem' towards a 'Solution' (1981). Munari's method consists of several steps based on experience that would help the students to frame precisely the design problem in all aspects (material and technology, ergonometic aspects, etc.).

After acquiring a sound and experimented methodological background, the second ambition was to give the students a strong theoretical base that would lead the students to understand the meaning of designing or making another chair or product. In that context the instructors provided the students bibliography and statements of reputable design masters who in some respect describe and justify their production and work method.

The aim of that was to direct students to explore the process of designing and manufacturing furniture as a research exercise and a constant learning process on function, material or technology which was supported by directing the students towards designers or makers that share their knowledge via digital networks and web which could be titled as today's "digital apprentices". This way it was aimed to lead students towards a scientific and critical analysis of the visual inputs and references they may get from the internet, as a commonly preferred source of information as well as guiding them to learn by making.

The last aim of the studio was to improve students' ability in describing and narrating their work with the aim of exploring the possibilities of communication and business opportunities to a larger audience by using digital media.

Course Structure and Motivations

The course, of the duration of 15 weeks, was structured in two main parts. In the first phase of the course (4 to 6 weeks), students were assigned to study a

given product from a manual edited by an established furniture design master or from graphical documents provided by professional practitioner. In the second phase (7 to 9 weeks) students worked on a design brief assigned by the instructors.

The first phase was to bring students in having a more analytical approach to problem of furniture making both from: theoretical issues, material characteristics, limitations and technical aspects as in Munari's methodological notes "Who did it before and what can I learn from them" (Munari, 1981).

During this first module of the course, the design masters works and manuals were used in order to strengthen their theoretical and cultural background. On the other hand web based open source digital apprentices resources were used to improve and understand manufacturing techniques.

Firstly, these guides provided to students solid design statements from previous experiences. As Mari stated in the interview released for Artek in 2015 the aim of Design is to question and understand "why" and 'How' a product is done as such (Artek, 2012).

In the second phase of the course, students were assigned a specific brief that would frame their own design project to be developed using the same procedure and method used in the first part of the course. Following the same steps used in the first phase as: understanding the brief, idea generation and sketching, modelling and prototyping in the university workshop and lastly narrating and describing their own process.

It is also important to mention that students were only allowed to use wood for the main structure of the furniture and eventually an additional material. This choice was made to make the students focus on the object itself and constructive aspects and experiment a methodic research on one single material that could eventually use on other technologies.

The choice of the authors / designers to be studied by the students was made under two main criteria: all of them mainly worked in wood. The main reason of working with wood was: availability in the market, possibility of having small productions that would motivate the student to start self-productions and because of the atelier facilities and machinery available in our university. We considered that the students should experience all phases of manufacturing by themselves in the university workshop as a crucial point of pedagogical development. The second criteria that motivated the choice of the example were their characteristics and design methodology.

Each of the three years we chose a designer/ maker of a different kind in terms of theory and practice. After having analyzed and adapted the drawings and made 1:5 models and 1:1 mockups of details and parts, students were encouraged and directed to follow web based digital open source materials. These guides provided students technical information on how to produce in 1:1 scale working prototypes of furniture that would be later exhibited.

Course Contents and Outcomes

Phase 01 Reproduction and learning from experience

As described in the course structure, in the three editions in which the course was thought in the past three years, we experienced working with three different professionals of different backgrounds, historical context and design methods.

In this first phase, students were asked not only to study, but to redraw and build within our university laboratory in 1:1 scale one the products. Also they were asked to modify some details and constructive aspects in order to adapt them to their capabilities and machinery available in the campus. This process of observation and reverse engineering led the students to better understand the techniques and design process.

In the past three editions we worked with: a collection of furniture self-built and self-produced by Chilean Architect Sebastian Erazo between 2013 and 2015 (1st Edition, fall semester 2016) (Fig.03), the collection designed by Enzo Mari in 1974 and collected in 'AUTOPROGETTAZIONE' book (2nd Edition, fall semester 2017); the furniture illustrated in the manual by Mario del Fabbro 'How to Build Modern Furniture' first published in 1957 (3rd Edition, fall semester 2018).

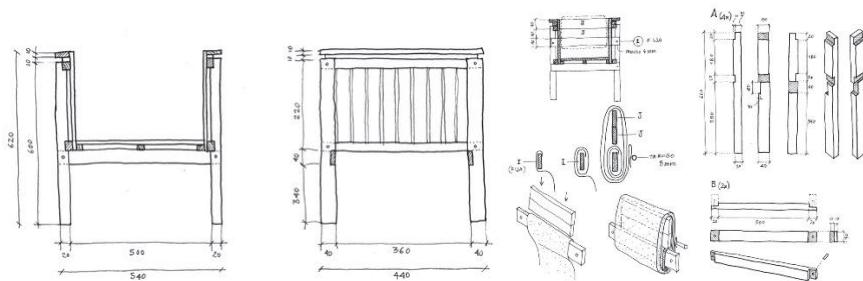


Figure 3. Sketches of Sebastian Erazo as sent from the author and delivered to the students (Courtesy of Sebastian Erazo, www.sebastianerazo.com)

The criteria that motivated the choice of the above designers, that would act as virtual mentors for the students, was dictated by: strong theoretical approach to the design problem in the case of Enzo Mari, the method applied by a practicing professional that would involve the acting of making as a method and someone is generationally close to the students as in the case of Sebastian Erazo and a manual that would consider mainly manufacturing problems and technical aspects of furniture making and probably directed towards a more specialized audience, Mario dal Fabbro.

Additionally open source digital apprentice materials available on the internet were shown to the students as for example: Ishitani Furniture (Fig.4) and The Minimalist Maker (Fig.5). This examples encouraged and directed the students to persist and search web based explanatory tutorials made by independent designers and makers and evaluate the contents. This material not only helped the students to solve problems related to manufacture and material techniques, but also directed the students to have a deeper and more critical and filtered

attitude towards the information they may find on the internet and also improved their skills in product narration and presentation.

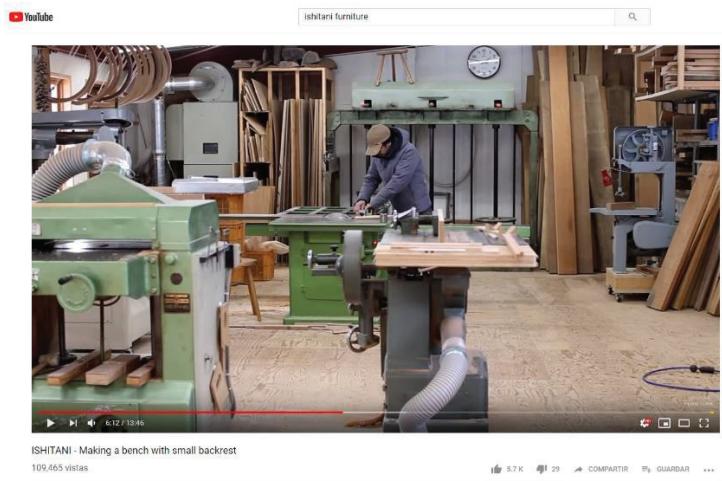


Figure 4. Ishitani Furniture Maker YouTube channel

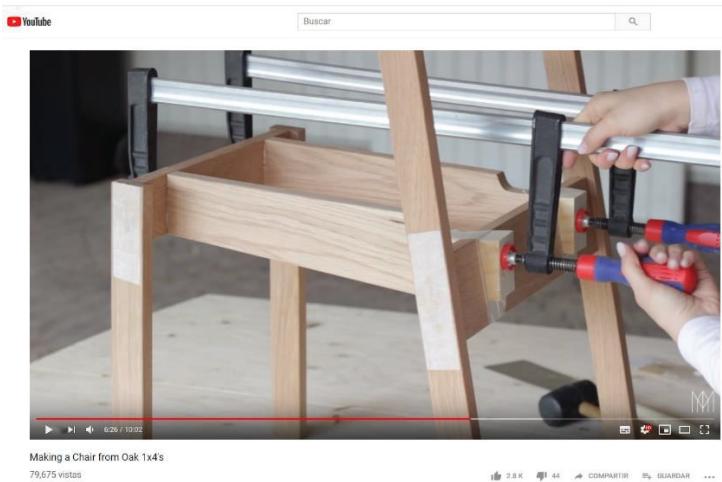


Figure 5. The Minimalist Maker YouTube channel

The criteria of the selection was directed towards 'Videos' made by makers that not only explained the technique of crafting their furniture but, the making itself would be part of their design process and a strategy of self-promotion.

In that sense their work differs from 'DIY' (Do it yourself) culture, that as Prestini states, DIY stops at the moment of 'Doing' or 'Replicating' something or an object. Their real aim of those Designers/Makers is to include in their design the

making process in order to put the user, or the observer in a position of understanding why and how objects are done. In that sense in continuity with Mari's spirit of "Autoprogettazione" (2013).

Phase 02 Original design after a brief

Following this phase, students were asked to work in designing their own products after a brief assigned by the instructors titled:

"Çayhane" (2016), which consisted in the reinterpretation of a Traditional Turkish Teahouse stools; "Learn, Read and Play" (2017), which consisted in designing and building furniture that could be used permanently in the Design studios in our Faculty of Fine Arts and Design; "I Am a Prototype" (2018), which consisted in a more exploratory exercise on building and joinery techniques. (Fig.06)



Figure 6. Samples of Students Final Works

Considerations on the outcomes

In the first phase experience we observed students' familiarity with ergonomic aspects increased parallel with their manufacturing techniques. Students had to also deal with some minor modifications of the drawings they received in order to adapt them for their purposes. This experience taught the students the limitations each material may have in terms of physical and mechanic characteristics. For instance in the second phase students understood that their design options should be limited into a precise frame defined by material, techniques and makers' abilities. This "discovery", that may have led to a certain level of frustration in their "creative" ambitions actually led to focus more carefully on the design brief. They started to concentrate in solving technical issues and details alongside considering the aesthetics of their final product. We observed a very careful attention to material exploration and approaching design practice as a research process that do not only consider form or style but mainly constructive aspects, in other words students understood that the final form of their product is strictly related with its function and the material used.

For example in the first edition, named *Cayhane* students were asked to work on the traditional tea house stool. This brief gave the opportunity to students to work on an object with very precise dimensions and at a first look with limited design options. Those restrictions actually turned to be an opportunity for the

students that opted for the application and research on materials such as textiles or stone that would refer to Turkish local fine crafts traditions. In that sense this group had the chance to work with Sebastian Erazo, who also work in design and local traditions as in the case of 'Mueble Campesino'. (Fig. 07) probably have influenced their work and way of thinking. (Fig.08)



Figure 7. Mueble Campesino by Sebastian Erazo, photo credits Bruno Giliberto (Courtesy of Sebastian Erazo, www.sebastianerazo.com)



Figure 8. Students working and experimenting traditional weaving techniques of weaving for their Cayhane Stool (Fall 2016 Semester)

On the other hand, we observed that semester of Mari had a hard time to deeply understand Mari's theoretical and critical statements, and couldn't succeed in realizing a product with the same formal austerity and synthesis of Mari. But what was very interesting that the students understood and later applied on their products, Mari's "Autoprogettazione" collection as an essay on structure applied to different category of furniture. In that sense we were not surprised to see citation of his work on other objects. (Fig.9)

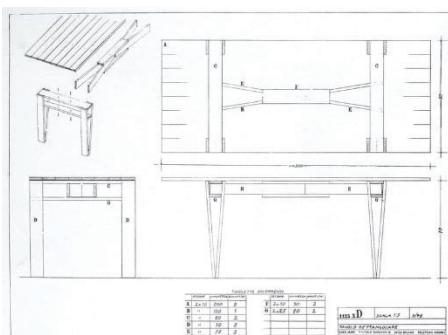


Figure 9. Students citation Enzo Mari's Autoprogettazione (below picture) dining table leg type in their own design final product (top picture) (Fall 2017 Semester)

With the application of Mario del Fabbro, we observed that students were more influenced by design solutions and joinery details provided by his manual. In this regard, it was also seen that structural issues were not as elaborate as Erazo or Mari, as an expected result, as the manual was not built entirely on this understanding. Regarding this issue, it could also be argued that Fabbro's approach also effected the final look of the product, as the style of the period had a strong character that was consistently portrayed throughout the book.

Conclusions

As concluding remarks, this study elaborated on how furniture design teaching methods could integrate a variety sources provided by established masters, furniture designers and makers that independently operate in the market using internet resources not only for promotional purposes but also as open learning resources. These sources were beneficial learning tools to establish a strong theoretical base for students. Also this process benefited from digital apprentices through web-based media which guided students to learn and enhance their crafting and manufacturing techniques, as well as their narration skills of self-production.

Another aspect that arose from this three-year experience was that as students tended to prefer gathering their sources of information from the internet, it is important to provide students with a strong theoretical background that would increase and guide their awareness in choosing the right visual material and analyze it in a critical and scientific way. In that sense the structure of this course that had the aim to create a bridge between masters and new generations, could be a beneficial teaching and learning tool which needs to be further explored.

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Learner Response to Brainstorming Techniques in a Design Thinking MOOC

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Abstract

In this paper, we describe the experiences of Massive Open Online Course (MOOC) participants with facilitating their own brainstorming sessions, applying brainstorming techniques they learned online. The conveyed brainstorming techniques are Silent Brainstorming, Hot Potato, Photo Brainstorming, and Plus 5. We examined a random sample of 21 participants out of 391 assignment learners. Based on learners' reflection sheet answers, we assume that learners are drawn to brainstorming techniques that a) are *straight forward* and require little facilitator intervention and b) provide inspirational resources that stimulate group members to make new connections. We suggest that online instructors can use brainstorming techniques as a tangible tool in conveying design skills, but they need to emphasize the repeated application and training of these methods.

Author keywords

Massive Open Online Courses; brainstorming; brainstorming techniques; design thinking; online learning

Introduction

Massive Open Online Courses (MOOCs) is digital educational material offered by universities and private companies. In their original spirit, these online courses are open to participants all over the world and free of charge, often drawing several thousand participants and presenting valuable opportunities for lifelong learning (Yuan, Powell & Cetis, 2013). In our research project, we conceptualize and run Massive Open Online Courses (MOOCs) on design thinking skills. Design thinking is a user-centered approach for problem solving and idea development. Stanford University initially extended and developed design thinking education programs, and the approach has been implemented in organizations internationally (Brown, 2009, Martin, 2009). Carlgren, Rauth and Elmquist (2016) found five recurring themes of design thinking in industry application: user focus, problem framing, visualization, experimentation and diversity in industry application and research. Various institutions visualize the design thinking process differently, e.g. IDEO, the d.school at Stanford University, the School of Design Thinking at the Hasso Plattner Institute in Potsdam, or the Rotman School of Management, but all these process models describe the three stages of data gathering, idea generation, and testing, in varying degrees (Carlgren, Rauth & Elmquist, 2016). We focus on the crucial skills of these design thinking themes and stages in our online courses and formulate skill-based learning outcomes, adapted from the classification of learning outcomes by Kraiger, Ford & Salas, 1993 (Taheri, Unterholzer & Meinel, 2016).

The authors conceptualized and ran two consecutive MOOCs in 2017 and 2018. The first MOOC focused on design research skills. Participants learned to identify striking user behavior and to plan, conduct and summarize qualitative interviews. The second MOOC, subsequently referred to as the *Brainstorming MOOC*, targeted the skills of synthesizing research data, facilitating brainstorming sessions, and summarizing ideas. 3641 learners enrolled, 1604 learners participated actively at the course middle, meaning they accessed the learning material. In the following, we examine established literature and research results on group brainstorming. We describe how we introduced four brainstorming techniques to course participants in the Brainstorming MOOC and lay out the different brainstorming techniques used. Subsequently, we examine the preferred and disliked brainstorming techniques of a random sample of $n = 21$ learners from the online course. We discuss the meaning of their preferences for brainstorming techniques as a tool in online course content.

Brainstorming

Brainstorming is an approach to generate ideas within a creative problem solving process. The advertisement executive Alex Faickney Osborn (1948) first used the term when he recorded his observations on creative thinking. He explained that the term stems from "using the brain to storm a problem" (1957), like a team of soldiers storming a castle. Osborn claimed that employees had more and better ideas when tackling a problem in a group and collecting a lot of ideas without evaluating them immediately. He introduced the concept of *deferred judgement*, explaining that employees with unusual but unformed ideas were discouraged from sharing them because their thoughts would be evaluated immediately (Frunham, 2000). The purpose of deferred judgement is to encourage team members to voice all ideas, even

bold, unusual, or impractical ones, and to ease their worry about being criticized by postponing the idea evaluation. In line with this, "withhold criticism" was one of the four general rules of brainstorming phrased by Osborn (1963), along with "go for quantity", "welcome wild ideas", and "combine and improve ideas". He furthermore made detailed descriptions on brainstorming procedures explaining group preparation, session climate, and group facilitation.

Osborn's claims were soon challenged by Taylor, Berry and Block (1958). Early research on group brainstorming revealed that nominal groups (of individuals generating ideas) outperformed interacting groups (or 'real' groups of teams brainstorming) in the number of ideas generated (Offner, Kramer & Winter, 1996). This low performance is mainly attributed to three group effects identified by Diehl and Stroebe (1987): social loafing, evaluation apprehension and production blocking.

Social loafing is the phenomenon of individuals being less motivated and exerting less effort when tackling a task in a group compared to working individually (Karau & Williams, 1993). This effect appears in a variety of contexts, ranging from physical to evaluational tasks (Frunham, 2000) and occurs when individuals do not feel personally accountable for the group performance, or feel like they have little influence on the results (Ruback, Dabbs, & Hopper, 1984). A related behavior is described as the "sucker effect", describing the matching of individual's performance to their group members' performances (Paulus, Brown, & Ortega, 1999). Thus, if one group member is loafing, others might lower their own performance level to protect themselves from carrying the highest burden (Isaksen & Gaulin, 2005).

Evaluation apprehension is an individual's fear of being judged or ridiculed for their opinions or ideas, which results in lack of participation. This fear allows less inhibited group members to dominate the session (Vroom, Grant, & Cotton, 1969).

Production blocking is a result of the waiting time forced on group members. Because only one person can speak at a time, other participants cannot voice their ideas immediately and might forget or disregard them. A lack of procedures that control simultaneous processing of ideas can be a major reason for production blocking (Bouchard, 1972; Isaksen & Gaulin, 2005).

It is important to note that many early studies on group brainstorming effectiveness examined the variable "idea quantity", but not the variables for "idea quality". Most studies were controlled laboratory settings instead of real work places (Kramer, Fleming & Mannis, 2001), and subjects consisted of students instead of professionals tackling a real problem they were engaged in. Teams had no past or future relationships and no past or future task interdependence (Sutton & Hargadon, 1996). Besides, teams mostly brainstormed in an isolated event (not within a larger problem solving process) and without a team leader or facilitator. Isaksen and Gaulin conclude that "a majority of the brainstorming research appears to ignore the importance of this facilitative leadership role" (2005, p. 323).

Facilitation and Brainstorming Techniques

Osborn (1963) recommended to have a trained leader or facilitator who would remind the participants of the brainstorming rules or encourage them to produce more ideas. Additionally, the group leader would employ helpful tools and structure the team's communication. Doyle and Straus (1982) defined the role of a facilitator as making sure that participants use effective techniques for accomplishing their task in the allotted time. While calling on a trained leader is widely practiced in organizations, research on brainstorming facilitation is scarce. Studies that do focus on brainstorming facilitation show that group moderators have a positive impact: Bouchard (1972) tested on forced participation, which may be similar to a facilitator asking all group members to participate. Forced participation brought the idea quantity level of interacting groups up to that of nominal groups. Offner, Kramer and Winter (1996) showed that interacting groups with a group facilitator outperformed groups without a facilitator and performed similarly as nominal groups. In a study by Oxley, Dzindolet and Paulus (1996), facilitated interacting groups outperformed nominal groups. Isaksen and Gaulin (2005) found that groups with facilitators produced more ideas than groups without facilitators by a ratio of more than 5:1. The most successful groups utilized a facilitator and applied a brainstorming technique named *brainwriting*, in which participants note their ideas on paper silently and exchange their notes with group members. Offner, Kramer and Winter (1996) suggest that a trained facilitator could stimulate group members to overcome the sources of production loss.

The positive effects of facilitating and structuring brainstorming sessions (found in research) have led creative consultants and design thinking practitioners to develop a range of brainstorming techniques (or methods), building on Osborn's original set of brainstorming rules (1963). In our course, we lay out these methods to a) support facilitators in overcoming group effects, and b) to improve the quality of ideas. Facilitators may overcome group effects by involving and motivating all participants and thus reach a higher quantity of ideas. They may improve the quality of ideas by introducing new sources of inspiration and encouraging the expansion of ideas.

Brainstorming Facilitation in a MOOC

The Brainstorming MOOC focused on the skills of synthesizing research data, facilitating brainstorming sessions, and summarizing ideas. Based on David Merrill's First Principle of Instruction (2002), we built learner skills by introducing topics, demonstrating skills, and asking students to apply what they learned. The learning material for the brainstorming facilitation session consisted of

1. an introductory video,
2. a podcast on brainstorming theory,
3. a facilitation instruction video,
4. a demonstration video showing a brainstorming team applying different brainstorming techniques,

5. an idea selection instruction video showing different selection methods,
6. printable poster material.

Brainstorming Technique Categories

In the demonstration video, the narrator explained four different brainstorming techniques. We chose the techniques by sorting existing brainstorming methods into four categories: *individual* (methods encouraging group withdrawal and individual brainstorming), *bodystorming* (methods employing physical activity), *perspective change* (methods offering new sources of inspiration by changing the team's perspective), and *idea linking* (methods encouraging the team to combine and connect their ideas). Subsequently, we presented one technique per category in the online course: 1) Silent Brainstorming, 2) Hot Potato, 3) Photo Brainstorming, 4) Plus Five (see Figure 1).



Figure 1. Video stills: A brainstorming team demonstrates the techniques of 1) Silent Brainstorming, 2) Hot Potato, 3) Photo Brainstorming and 4) Plus 5 (from top left to bottom right).

Silent Brainstorming allows participants to write down their initial ideas in silence for an allotted amount of time. Afterwards, each participant shares their idea while the other team members listen carefully. This technique mirrors Osborn's (1953) original instruction of positioning group brainstorming within slots of individual brainstorming before and after a session. Thereby, the technique attempts to overcome production blocking (Furnham, 2000) and social loafing. Paulus et al. (2016) conducted initial research on varying solitary and group brainstorming in short-term sessions, and found a rise in idea quantity. Silent Brainstorming allows each participant to collect all their initial ideas without being influenced by other participants. We therefore consider the facilitation effort for Silent Brainstorming as low.

We categorize *Hot Potato* as a bodystorming technique. Team members stand in a circle and throw a ball or another object from one person to the next. Each person holding the object, or “hot potato”, needs to call out an idea as fast as possible and pass the object on. A facilitator or team member notes down all ideas and presents them on a surface after a few rounds. This technique targets the phenomena of social loafing and evaluation apprehension. It exerts time pressure on candidates and persuades them to call out any idea that comes to their mind, without judging it. Physical movement has positive effects on creative thinking (Oppenzo & Schwartz, 2014) and cognitive performance (Budde et al., 2008). Facilitators need to give team members some time to get accustomed to this technique, as participants may feel uncomfortable in the beginning. They should maintain a dynamic atmosphere in the team and might take notes for team members. Thereby, we consider the facilitator effort as high.

Photo Brainstorming is a technique that allows group members to take a perspective change and offers new sources for inspiration. The group looks at a random picture and comes up with different ideas associated with the image (see Figure 1). These may be different attributes: colors, shapes or emotions can trigger different associations and result in new ideas or idea combinations. By introducing these new sources of inspiration, facilitators may impact the quantity and quality of ideas. Team members note down their ideas and share them aloud later. This technique reflects the practice of designers to collect images, both related and not related to their design topic, which they assemble in moodboards (Keller, 2005). These images may serve as inspirational stimuli in the design process (Cai, Yi-Luen Do, Zimring, 2010). Facilitators have to explain the method and its advantages very clearly to group members. We therefore consider the facilitation effort as medium.

Plus Five is a technique that helps participants to build on the ideas of others. We categorized it as an idea linking method that can be used when the team has already collected a range of ideas. Participants cluster all idea notes and take a look at them. Then, each team member picks one idea that they would like to expand on - preferably an idea of another team member. Everyone puts the idea note they chose on a piece of paper and adds five more ideas to it. These can either be new thoughts inspired by the core idea, or more detailed additions to the core idea. After an allotted period of time, every participant shares their set of ideas. This technique helps team members to make links between existing ideas, and to draw inspiration from their team member’s thoughts. Group members that are exposed to the ideas of others may come up with more original ideas, and larger amounts of ideas (Dugosh & Paulus, 2005; Hargadon, 2008). *Plus Five* may initiate the idea evaluation phase. We consider the facilitation effort as medium, because facilitators need to explain the technique steps clearly and have to motivate team members to expand on an idea that is not their own.

Method Name	Method Category	Facilitation Effort
Silent Brain storming	Individual	Low
Hot Potato	Body storming	High
Photo Brain storming	Perspective Change	Medium
Plus Five	Idea Linking	Medium

Table 1. Overview of brainstorming techniques and categorization.

Brainstorming Assignment Task

In the MOOC assignment, learners had to facilitate their own brainstorming session with a group of at least three team members. They tackled a brainstorming question that they rephrased in the synthesis phase. We encouraged them to find team members in their professional or private context, and to apply the techniques they saw in the demonstration video. The central learning objective of this assignment was to "apply brainstorming techniques and principles". Participants had learned about the proposed time frames for different techniques, and the role and rules of a brainstorming facilitator. Subsequently, they filled in a reflection sheet (see Figure 2). In the reflection template, participants commented on the brainstorming techniques that a) worked best for them, and b) they disliked. We examined a random sample of 21 assignments, focusing on two research questions:

Question A: Which brainstorming techniques do sample participants prefer or dislike?

Question B: Are brainstorming techniques a useful content unit for online instructors teaching brainstorming skills?

We considered the quantitative amount of brainstorming techniques mentioned, and drew conclusions from the qualitative explanations given by participants.

7 - How Might We Question
Write down the HMW Question you have created:

8 - Brainstorming Technique

Which Brainstorming Technique worked best in your session? Tell us why!	+	Which Brainstorming Technique didn't work well in your session? Tell us why!	-
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9 - Idea Selection Techniques

Which Idea Selection Technique worked best in your session? Tell us why!	+	Which Idea Selection Technique didn't work well in your session? Tell us why!	-
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10 - Brainstorming Session Checklist

Go through the list on the right and tell us about your shortcoming as a facilitator. What would you do differently next time?

- setting up the space - preparing material (pens papers, sticky notes) - reminding your team of the transforming mindsets - making your HMW Question visible - keeping the time - clustering ideas
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Figure 2. Brainstorming reflection template.

Sample

In total, 3641 learners enrolled in the Brainstorming MOOC, 1604 learners participated actively by course middle, and 392 learners successfully participated in the course assignment. Learners from 69 countries took part in the course. Most enrolled learners participated from Germany (24,01%), followed by the United States (1,48%) and Switzerland (1,02%). With 53% of survey participants identifying as “male”, slightly less female participants (47%) attended the course. In the pre course survey ($n = 945$), 77,57% participants ranked their design thinking experience as “none” or “beginner”.

For the assignment analysis, we chose a random sample of 21 brainstorming reflection templates (out of $n = 392$ participants who successfully participated in the assignment). The sample represents learners who uploaded their assignment early on, midway, or shortly before the assignment deadline, and who filled in the relevant template boxes. The sample participants reached an

average of 64,57 points in the peer-reviewed assignment, out of 72 possible points.

Results

We examined the reflection sheet answers “Which brainstorming technique worked best in your session? Tell us why!” and “Which brainstorming technique didn’t work well in your session? Tell us why!”. Four participants named two preferred techniques, and one participant named two disliked techniques, accounting for a total of 26 mentions of preferred methods and 22 mentions of disliked techniques (see Table 2 for detailed overview).

Method Name	Most Preferred	Least Preferred
Silent Brain storming	13	2
Hot Potato	1	12
Photo Brain storming	4	4
Plus Five	8	2

Table 2. Overview of most and least preferred brainstorming techniques in the random sample.

13 sample participants described *Silent Brainstorming* as their preferred method, explaining that group members felt comfortable with the technique, had time to prepare their notes, and actively listened to each other. Several participants ($n = 6$) underlined the quantity of ideas created with this technique. Only two participants named *Silent Brainstorming* as a disliked technique. They stated that they struggled because this was the first technique they used, and it took some time to warm up their team up (Sample Participants #13 and #20).

Eight learners named *Plus Five* as their favorite brainstorming technique, describing how learners drew inspiration from building on previous ideas: “Everyone seemed to be very inspired by the idea pool that was already created by the group” (#17). Two participants named *Plus 5* as a disliked technique. Their team had a low number of participants, or the technique did not lead to new ideas (#1 and 21).

Photo Brainstorming was named as a preferred technique by four participants, with participants describing the technique’s strength of sparking new ideas in their group. Sample participant #19 explained: “I had a picture of a street market. It had a lot of detail and atmosphere. Some of the best ideas were generated in this session.” Based on the street market association, the team developed a solution inspired by a supermarket line. The same amount of

learners ($n = 4$) listed *Photo Brainstorming* as their least preferred technique. Those who disliked the technique stated they struggled with explaining the concept of the technique as it was “too abstract” (#11).

Only one participant (#21) named *Hot Potato* as their favored technique, explaining that this technique keeps “everyone on their toes”. Twelve participants listed the bodystorming technique as their least preferred technique. Learners explained that they struggled with keeping the dynamic speed of the technique up (“We were all quite tired and even ‘Hot Potato’ did not manage to wake us up. The ball stopped too often for it to be a successful technique for us”, (#10), or said that their group felt too stressed and gave up (#19). Participant #11 criticized that their group preferred to think about their ideas before voicing them quickly. This behavior undermines attempts to circumvent evaluation apprehension with this technique, though.

Discussion

In the following, we discuss the application of brainstorming methods for novice design thinking practitioners and implications for the teaching of brainstorming facilitation in a MOOC. In the course survey, 77,57% participants identified themselves as design thinking novices or beginners. We thus assume that the majority of learners in our sample are likewise novices or beginners in facilitating a design thinking brainstorming session.

The preference of 13 sample participants for the *Silent Brainstorming* technique aligns with our categorization as an “easy” technique for facilitators: easy to explain and easy to conduct. Facilitators do not need to put a lot of pressure on the group and will still receive a large amount of ideas. They are not required to push team members out of their comfort zones.

Eight participants preferred the *Plus Five* method. This suggests that the technique enables novice facilitators to encourage the linking of ideas.

With twelve mentions, *Hot Potato* was the least preferred method by sample participants. As a facilitator, this method requires plenty of intervention: spurring on the team, keeping the speed and dynamics up, helping team members to ease into the situation, and (ideally) noting the ideas down. Although the method is designed to overcome evaluation apprehension, it may on the contrary reinforce feelings of uncomfortableness, particularly in hierarchical teams. Inexperienced facilitators may struggle with these obligations, and inexperienced brainstorming teams will have greater difficulties to reach a flow of ideas.

Participants equally mentioned *Photo Brainstorming* as a positive and a negative experience. As facilitators, some participants experienced the method as a helpful tool to inspire their group, while others found it more distracting than purposeful.

Which brainstorming methods do sample participants prefer or dislike?

We conclude that sample participants prefer straight forward brainstorming methods when facilitating a brainstorming session. They like techniques that

do not require much explanation, movement, or might make their participants uncomfortable. As beginner facilitators, they tend to avoid embarrassing situations both for themselves and others. Sample participants also realized and emphasized the helpfulness of methods that facilitate the connection and inspiration of ideas, though. These findings suggest that the brainstorming methods and facilitation instruction conveyed in our online course can provide a base, but learners need to implement and train these skills more often to acquire a sense of confidence required from a facilitator.

Are brainstorming techniques a useful content unit for online instructors teaching brainstorming skills?

Brainstorming methods seem to constitute an effective tool for beginner facilitators: in their assignment sheets, sample participants described the advantages and disadvantages of methods, showing their reflection of the toolset. Since methods like *Silent Brainstorming* or *Hot Potato* can help facilitators to circumvent group phenomena such as social loafing or production blocking, they can support novice facilitation. For online instructors of design (thinking) skills, we suggest that a) brainstorming methods are a helpful tool to convey successful brainstorming facilitation skills, b) instructors need to encourage beginner facilitators to push their own boundaries and aim for higher effort methods, and c) instructors need to emphasize the repeated application of methods in brainstorming sessions.

Our findings are limited because not all sample participants may have tried to apply all four brainstorming methods. For future research, it would be fruitful to examine a bigger sample, and to conduct follow-up interviews with learners.

Conclusion

In this paper, we examined a MOOC unit on brainstorming facilitation. Participants learned about brainstorming, idea selection and brainstorming facilitation techniques through various materials. Learners then facilitated their own brainstorming sessions and, as part of their assignments, reflected on their preferred and least liked method in a reflection sheet.

We found preferences for a) straight forward methods with low requirements for facilitation but large outcome in quality, and b) methods that enabled facilitators to use sources of inspiration. Sample participants were less content with methods requiring high facilitator intervention. We conclude that brainstorming methods are helpful tools for beginner brainstorming facilitators, and a tangible content unit in an online course on design thinking skills. Nonetheless, instructors need to emphasize the repeated application of these methods in real-life brainstorming session to support learners in developing confidence with the methods and in their role as facilitators.

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Journalism Students Prototyping a Brighter Future

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Abstract

Too many young people are worried about the future. The ongoing discourse about an unpredictable work-life in an increasingly complex and fast-changing world can seem frightening and depressing – not least for journalism students finding their place in a radically changing media industry (Allen, G. et al. (2015). This discourse might be contributing to the increasing number of young people being diagnosed with stress and depression (mentalhealth.org.uk), but might also initiate a new search for a meaning in life (DM, 2017, ESENER, 2018). It is no wonder that students need knowledge and tools to approach this ‘new’ world. This paper describes a three-day workshop that aims at preparing journalism students for internships, as well as for the future. An internship is the first step into the labour market, and it generates both dreams and worries. The students are introduced to a ‘Life Design Attitude’ that represents a creative approach to the world including design activities revealing additional and different perspectives, reframing and prototyping. Moreover, the students are presented with ‘the 4-Foci Model’, combining an ‘inner focus’ with an ‘outer, business focus’ – a way of transforming ‘what I am good at’ into something that adds value in a business. Finally, focus is on the creation of an application for an internship. The workshop, offered to around 100 students, is a new initiative that differs radically from other courses offered at the school. Attendance in the course is not compulsory. Half of the students participated for only one day; the other half participated all three days. Based on mixed methods we have conducted a qualitative and a quantitative analysis: Some students found working with themselves to be uncomfortable and/or the workshop was too ‘creative’. Others found the workshop fruitful as it provided a new way of thinking. ‘Reframing’ was primarily understood in the simplistic interpretation of ‘having a more positive outlook on life’. Furthermore, the students had difficulties in working with the outer, business perspective. The workshop points to a need for a more varied understanding of ‘creativity’ and to a potential for using creativity and a design approach in work as well as in life in general.

Author keywords

Life design; values; prototyping; reframing; creativity; design attitude; entrepreneurship.

Introduction

There is wide consensus that the future labour market in journalism will be very different from today and increasingly dominated by free agents (weforum, 2018, Upwork, 2018, Danish Union of Journalists, March, 2019). To meet these changes in the market, a series of entrepreneurial initiatives have been implemented in higher education. Typically, these initiatives are offered to students at the very end of their studies, which leaves the impression that entrepreneurship is considered 'a tool' or 'a quickly learned competence' rather than 'an attitude' you need to build and train during the entire education (Sørensen & Davidsen, 2017).

Though there are different practices related to entrepreneurship education (Pittaway and Edwards, 2012), ranging from teaching 'about' the business side of entrepreneurship to inculcating an entrepreneurial 'spirit' (Blenker et al., 2011), neither of them addresses the urgent human challenges – that students are increasingly vulnerable to mental health problems. Young people are feeling a high pressure to be successful. Some 60% of young people (aged 18 to 24) have felt highly stressed by a pressure to succeed (2018, mentalhealth.org.uk). In Denmark the number of adult citizens having been diagnosed with stress has increased by 22% in five years (www.kl.dk, jan.2019).

Noemi Katzenelson, professor and director of The Centre for Youth Research in Denmark argues: Young people are limited by a performance culture; they are abandoning their dreams and they are not thinking outside the box. Also, they have difficulties having a sense of themselves. According to Katzenelson, it is important that young people learn to have a sense of themselves, understand what is important to them, what they need and what is valuable to them. Moreover, young people need "tools to navigate through life's maze," in order to learn flexible thinking, to think in terms of plan a, plan b and plan c. (Katzenelson, 2018).

No doubt, the future labour market and the future in general calls for 'new tools'. Novel fields within design (cp. SIGWELL, Design Research Society) have already demonstrated that a design approach and creative design activities can be seen not only as 'new tools', but also as a new approach and a set of activities that can guide human beings in becoming creators or designers of their own life (Evers & Burnett, 2016, Birsel, 2015).

Theoretical background

Numerous educational researchers have highlighted the central role of creativity and imagination; still little attention has been paid to these human capacities both in entrepreneurship and in education at large (Nielsen & Storvang, 2015). However, creativity and imagination are central capacities not only in relation to entrepreneurship, but also in adjusting to changing environments, making changes and shaping an unknown future (Robinson, 2010, 2011, Greene, 1978, 1995, Langer, 1997, 2004, Goleman & Senge, 2014).

It is crucial for human beings to be conscious about themselves, their predefinitions or 'labels' (cf. Langer) and their mental steering models, which enable them to see opportunities and break with the well-known (Greene, 1995, Langer, 1997). Maxine Greene was an educational philosopher who fought for the role of imagination and the arts in education. For her 'education' was about helping human beings to invent themselves and create meaning and value in life, she argued: "Identity is never fixed, we are always becoming" (Greene, 1978, 1995). Likewise, researchers in creativity argue the mental processes related to creativity make us each unique and help breathe meaning into our lives (Kaufman & Gregoire, 2016).

Today, we ought to consider creativity and imagination as human capacities (Kaufman & Greoire, 2016) that are more important than ever, since young people have 'to create themselves' (Greene, 1978, 1995, Hammershøj, 2014) they are becoming free agents and they have to be their own 'chief executive officers' (Drucker, 1999). This understanding of creativity represents a humanistic perspective on creativity: creativity is a human capacity for self-actualization and personal development opposite to the understanding of creativity in the knowledge economy, which is seen as a competence you use for innovation at your work place (Stepper-Larsen, 2011, Stephensen, 2018). The humanistic understanding of creativity is central in the present workshop: The Life Design Attitude and the 4-Foci Model introduced in the workshop intend to help people *create* the life that is meaningful to them, to help people become *creators* or *designers* in their own life, assert leadership in their life – an example of 'designerly ways' (Cross, 2004) of empowering people (Buchanan, 1995).

In this workshop we introduce participants to a 'Life Design Attitude' and the '4-Foci Model'. These two models form the basis for people who want to try to apply this approach and attitude to life. The two models are a result of 10 years of on-going research primarily in the field of design research and practice, but they are also built on theories from related fields such as entrepreneurship, business, self-leadership and brain science. In a PhD dissertation about strategic design (Sørensen, 2011), design processes were used not only in relation to business strategy, but also for personal strategies in life. Several workshops and processes have been further developed over the years, particularly with entrepreneurs, (Sørensen 2011, Sørensen & Evers 2015, Sørensen & Davidsen, 2017). This has led to the development of the 'Life Design Attitude' and the 4-Foci Model.

The Life Design Attitude is based on existing research. In design theory design is described as a 'multifaceted nature' and includes various definitions and

activities (Lawson & Dorst, 2009, Lawson, 2005). In 2004 Boland & Collropy introduced the notions 'Design Attitude' as opposed to 'Decision Attitude'. The authors claimed business education was in need of a new approach. Inspired by Frank Gehry's designerly approach to business, they introduced the creative 'Design Attitude' that stood in contrast to the rational and analytic 'Decision Attitude'. Later, based on a study of designers working in organizations, Michlewski (2016) made a deeper characterization of the notion of 'Design Attitude' describing five characteristics (see Figure 1):

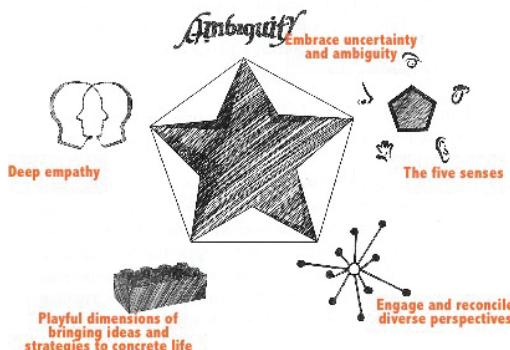


Figure 1: Design Attitude (Michlewski, 2015)

Boland & Collropy and Michlewski refer to designers' attitude in a work place, whereas a newer field within design research and practice uses terms such as 'Life Design' or 'Design for Quality of Life' (SIGWELL, Design Research Society, Birsel, 2015). Also, Evans & Burnett (2016) describe how you can use design activities when designing your life. The 'Life Design Attitude' is a set of design activities that form an approach, *an attitude*, which is appropriate in life. Boland & Collropy accentuate that design is not only restricted to a method, a process or a set of activities, rather it is *an attitude*. That means you can learn to adopt a Life Design Attitude, which consists of an overall approach and a practice e.g. visual sensemaking, reframing etc.

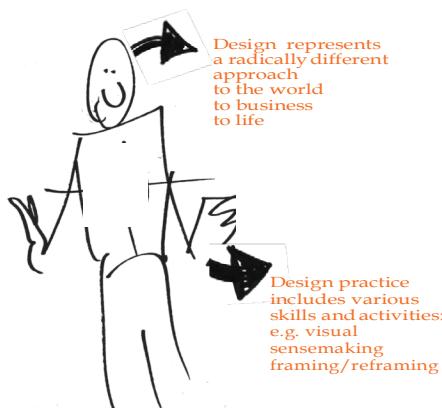
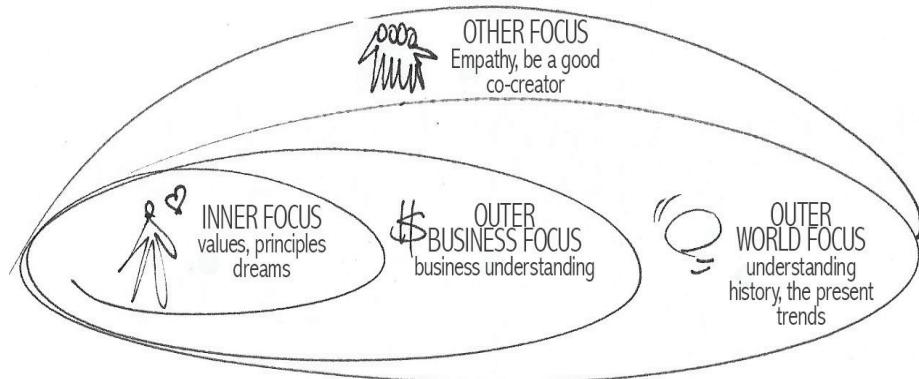


Figure 2. Design as an overall attitude and an additional practice.

The Life Design Attitude works together with the 4-Foci Model, which reminds you to have several different foci. The 4-Foci Model is inspired by Goleman & Senge's *Triple Focus – a New Approach to Education* (2014). In their book they argue that future students need three core skills: understanding self, other and the larger systems within which we operate. The model or idea is based on Goleman's expertise in emotional intelligence and Senge's expertise in learning and systems thinking.

The 4-Foci Model, as opposed to the Triple Focus model, is based on design research and practice and also includes an entrepreneurial perspective, a business perspective and a perspective on co-creation and citizenship (not part of this workshop). Inspired by years of working with entrepreneurs and helping students to work as free agents, we consider these foci highly relevant, as free agents have to be able to 'switch' between different perspectives:



THE 4 FOCI MODEL:

Inner focus - focus on your values, your strengths and weaknesses, what you are passionate or curious to try out, how to take care of yourself.

Related to inner focus is e.g. knowledge about the brain, how to take care of yourself, focus, control of your thoughts.

Outer business focus - how you can transform what you are good at into something that adds value in a business or in the world.

Related to the outer business perspective is basic knowledge about a business, business modelling, value propositions and users' pain and gain.

Other focus - how to understand and interact with other people. How to co-create and be a good 'co-creator' yourself.

Related to the 'other focus' is knowledge about ethnography, user research, empathy mapping, how to understand other people, how to co-create, build communities and be a good co-creator and citizen yourself.

Outside world focus - how to understand the world, your history, the present, society, democracy, the changing values and trends.

Related to 'the outer world' perspective is knowledge about time and history, democracy.

Figure 3. The 4 Foci-Model

The Life Design Attitude is a set of different activities. As this paper analyses one specific workshop, we will not provide an in-depth explanation of all the activities in the Life Design Attitude but focus on the design activities used in this workshop, i.e. 'reframing' and 'prototyping'.

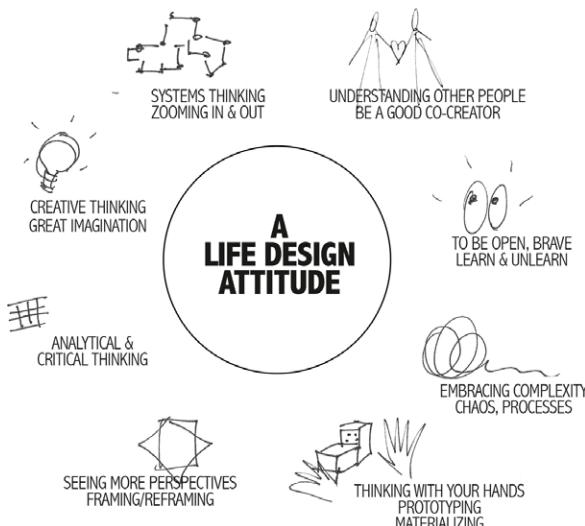


Figure 4. The Life Design Attitude (work-in-progress)

Research Data & Methods

In the research we have used mixed methods, combining qualitative and quantitative research methods (Brannen, 2007). The data is gathered at a workshop for around 100 journalism students, half of them participating all three days.

Teaching team and framework

'Preparation for Internship' is a new course. The organizing team included three individuals: The Head of Internship, an expert in digital learning and a design teacher and researcher.

Participation

The workshop was part of a week-long course, but was not compulsory. On the first day of the workshop around 100 students participated; on day 2 and 3 there were 45-50 participating students.

Top PADlet:

- Strengths:** Hardworking, humble.
- Weaknesses:** Impatience.
- Value proposition:** I want to inspire people to read/listen to my stories. I am a good listener and can relate to others. I am a good communicator by writing well-documented news articles.
- Change focus:** Adjusting / creating a match!
- Type of Journalist:** I think that I am the type that wants to become a journalist who is occupied with stories which are relevant for society.
- My Values:** A successful journalist.
- Ambitions:** Someone who reaches the goals of their dreams and do something that they are passionate about.
- Reflections - How can I contribute:** Positive, try to give some things to others, try to give something, help people to be happy, self-improvement etc.

Bottom PADlet:

- Strengths:** Effective; good at getting things done, even when it does not go according to plan.
- Ambitions:** Ideally, I want to do something different and not the same for many years in a row.
- Human Role model: Jon Stewart:** One of the funniest comedians and most effective and satirical communicator in USA (in my opinion).
- Weakness:** Find it difficult to take good photos.
- Human Role model: Kristoffer Eriksen:** Good interview skills; does both experience interview (radio/24syv) and critical parts interviews (Døkter).
- Overall Journalist type:** Rational, Journalist; a craftsman.
- Successfull qualities:** Good communication skills, good listening skills, good writing skills, good editing skills, good presentation skills, good personality, good training, good knowledge in English language, more English than the norm, good organisational skills, good leadership skills, good project management skills.

Figure 5: Examples of students' individual PADlets (pictures changed, excerpts of texts)

In all 36 students submitted their personal PADlets, which is a dynamic, digital 'blackboard'. This gives each student quick access and an overview of all their assignments. The idea is that each student can gather their work, reflections and ideas in relation to their application for an internship and for future work. These PADlets include the individual assignments.

Questionnaire:

Forty students participated in an on-line questionnaire. Questions are centred on notions and reflections.

Video interviews:

Ten students participated in a personal video interview on a presentation of collages, reflections on doing the collages and experiences from the workshop.

Interview

An interview with the Head of Internship after the workshop.

Experiment

This paper describes a new and non-compulsory workshop: "Preparation for Internship," offered to around 100 students at the Danish School of Media and Journalism. Experiences from recent years show that preparing for an internship can be a challenging process. All students apply for an internship, but up to 25% of them might be rejected on 'Panic Day', the nick name for the day on which media institutions hire their interns. To most students, this process is very stressful and most students consider not getting an internship as a personal failure.

The internship is also the very entrance to adulthood and a changing labour market that calls for new ways and values: a new understanding of 'employee', 'work' etc. As Evers and Burnett point out, people are dominated by 'old' and 'dysfunctional beliefs' like thinking, 'my job is out there waiting for me'. But that is wrong. Today 'you have to create your own job' (2016, 64). Another perspective we want to address is, as mentioned, that especially young people are vulnerable to mental health problems. According to a recent report from OECD educational institutions have to educate students not only for a job, but also for "quality of life" and "well-being" (Education 2030, OECD, 2018).

Workshop programme

In the three-day workshop we offered reflective, learning processes through making in which the students worked with different types of assignments including personal values. People seldom reflect on their personal values (Sørensen, 2011, Evers & Burnett, 2016). Particularly, we wanted to help the students to reframe some of their dominant, 'old' values and assumptions related to concepts such as 'journalist', 'life' and 'success'. Traditionally, in the

field of journalism, 'a successful journalist' is working on a nationwide newspaper or nationwide television. Likewise, many students think they need to make one plan and then execute it, or you have to make the right choice, first time around, otherwise you will fail. Alternately, you can think you just have to choose one for now and build your way forward (Burnett & Evans, 2016). Therefore, our workshop is centred on three things: reframing, prototyping of different futures and the introduction and working with the 4-Foci Model – how to transform an inner focus to an outer business focus. Our intention is to help the students build the competency of seeing and creating new possibilities in life and discover more perspectives. Here 'reframing' is one of the most crucial design activities (Dorst 2011, Sørensen, 2011). So is prototyping or materializing (Michlewski, 2015, Pallasmaa, 2009) which appeals to deeper levels of knowledge (Sanders, 2002).

Day 1: Working on an inner focus – intro

This day included a talk about the future labour market, future competencies and an introduction to a design approach, to the Life Design Attitude and the 4-Foci Model. Focus of the day was to look at your experiences, spotting signs of well-being, role models etc. and being introduced to 'reframing'.

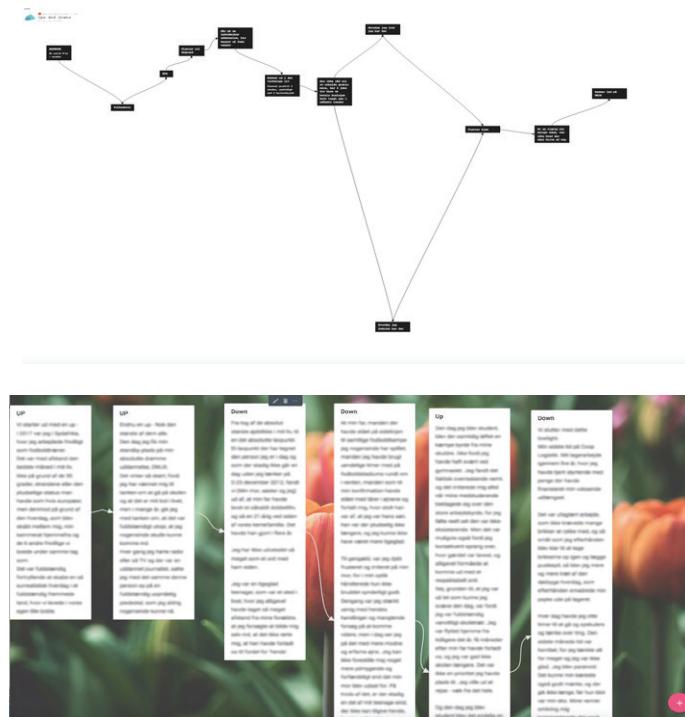


Figure 6: Spotting signs of well-being in your life journey, which includes illustration and reflection on the ups and downs in your life. Here are some examples of life journeys.

Different types of reframing

Reframing is one of the most essential design activities (Dorst 2011, Kolko, 2010, Sørensen, 2011). In his book *Frame Innovation* Dorst (2015) argues: Stop solving problems. Instead we must reframe problems. As Einstein once said, we cannot solve problems using the same kind of thinking that we used when creating the problems. Yet, people seldom know what exactly this means. Therefore, in our presentation, we used the following illustration of the problem with the old light bulb with filaments that used too much energy. Someone made a problem definition saying, how can we develop a new bulb that uses less energy? A good example of a very small problem definition and thus a small solution space. This problem definition led to the Energy Saver Bulb, which gave a bad light, had no effect on CO₂ emissions, contained toxic mercury etc. – but it used less energy.

This case illustrates the fact that we tend to focus on the immediate problem and automatically solve problems using the mindset with which we created the problem. This is exactly the meaning of Einstein's warning. Instead, we can 'reframe' problems and open up the problem space. In this example the problem could be reframed into the questions: How can we rethink light? How can we create more sustainable solutions?

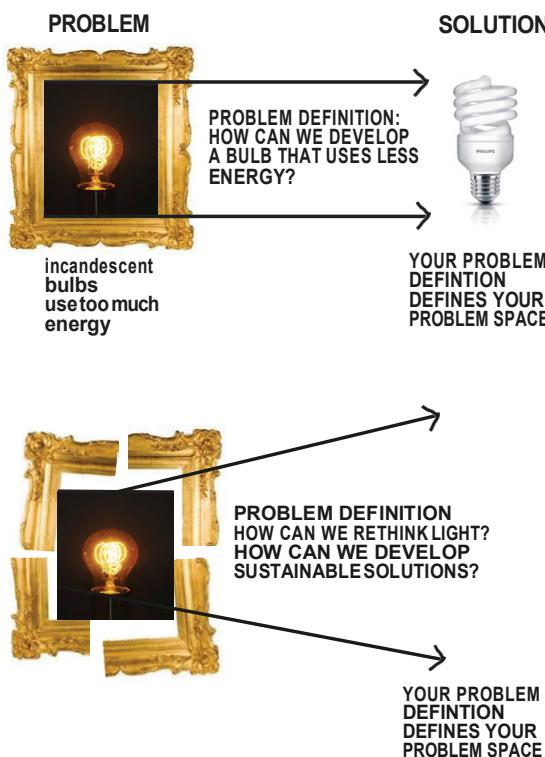


Figure 7. Illustration of reframing

In the workshop we also gave examples of how reframing can be used in order to reframe ‘meaning’ (Verganti, 2009). Philips for example reframed ‘light’ (and their business) from a practical issue into light as ‘light therapy’ and ‘health’. Finally, the students were given examples of how reframing can be used in life, reframing ‘the labels’ (Langer, 2009) you have put on things, people or on yourself e.g. from being a victim to being a leader in your life. Reframing in life links to contemporary brain research into the body/mind relation and how your expectations about the future to a high degree influence your experience of the future (Langer, 2009, 2016, Schwartz, 2012, Lotto, 2017).

Day 2: Working on an inner focus. The power of prototyping and materialization

This day included a talk about personal values, reframing, prototyping and materialization. Besides reframing the students were introduced to materializing and prototyping, crucial design activities that can appeal to deeper levels of knowledge (Sanders, 2002). Designers are building everything. Building is a way of thinking and ‘making sense’ of things (Kolko, 2010, Lindgaard & Wesselius, 2017). Materializing is to make implicit sensemaking processes explicit. While creating a collage, you are ‘thinking with your hands’ (Pallasmaa, 2009), you have a conversation with the material (Schön & Bamberger 1983), which leads to questions, reflections and new perspectives. Making collages is another way of thinking, building your way forward. Designers “make meaning out of data through interpretation and modeling” Kolko, 2010). Prototyping is easy, yet challenging if you consider creative activities to be ‘unserious’.

Day 3: An outer, business focus – Business Model Canvas

This day focussed on the internship application, on developing value propositions and changing the focus from an inner perspective to an outer, business perspective.

The students were introduced to the Business Model Canvas (Osterwalder and Pigneur, 2012), which is a simple and easy-to-understand business model. Moreover, they were introduced to the idea of describing different ‘value propositions’ (Osterwalder et al., 2014) – what you have to offer a company or end-users. One assignment was to switch focus and perspective: An example of switching from an inner perspective could be: “I am passionate (my interest) about making podcasts for young people.” A reframing into an outer, business perspective could be: “Young people often feel lonely (my user’s pain), I can offer/intend to learn (as I am a student) to develop podcasts and interaction with young people in a way that makes them feel included and part of a community (what my users gain).”



Figure 8: Day 3, the students were also working on idea generation, visual expressions, mottos and manifestations – a starting point for their application.

Insights and reflections

In the following paragraphs we will present our insights and our reflections. Our focus was to help the students build the competency of seeing and creating new possibilities in life and to introduce them to the idea about having different foci. Thus, our workshop was centred on three things: reframing, prototyping of different futures and the introduction of the 4-Foci Model, opening up for more perspectives.

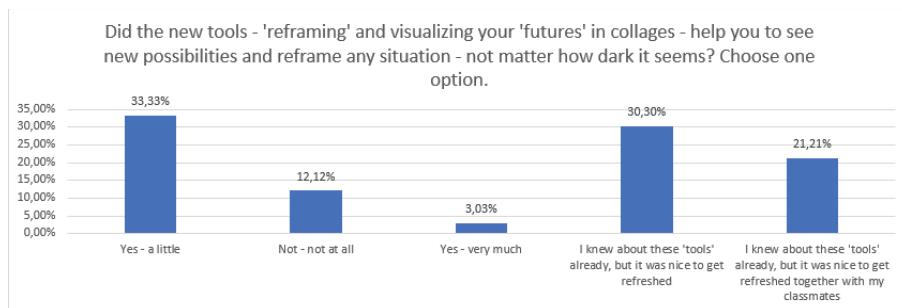
Insights related to working with reframing

The assignments were formulated as follows: Build your internship day, visualize three future scenarios, starting from the 'internship day', then visualize the half year period with internship/no internship and visualize 'different places you could be in three years from now'. The students were encouraged to use reframing, to see, explore and create new possibilities.

Future scenario 1: You will get the internship you are dreaming about.

Future scenario 2: You are disappointed; you will not get the internship you were dreaming about.

Future scenario 3: What you feared happened; you will not get any internship.

**Figure 9:** Questionnaire on new tools

Despite an error in the questionnaire* we can conclude that students think reframing can help see new possibilities and reframe situations. Some have been made aware of new possibilities (32%), some are already familiar with reframing (50%), 12% answer 'not at all'.

Yet, from the qualitative analysis (PADlets) it appears that there are different interpretations of the notion of 'reframing'. When working with societal problems the students demonstrated reframing of problems and new perspectives, but in their collages, many display a poor understanding of 'reframing' – a simple matter of 'taking a positive perspective'.

This is reflected in some of the students' statements on reframing below. Some understand it as 'taking a positive perspective', as seen in the following statements: "...*The thing about making bad situations seem better, is not exactly reinventing the wheel*"... "I heard several of my peers speak negatively about this type of thinking, because they think it is too simple..."

Others have discovered the complexity and possibilities in this activity. Kolko describes reframing as "an act of purposefully shifting the normative frame...in order to see things from a new perspective" (Kolko, 2010). Finally, reframing can include a reframing of a meaning (Verganti, 2009). This is seen in these statements: "*In the beginning, it was like 'wow' - I couldn't really relate to it - but when we started working with [the assignments] yesterday, I thought it made a lot more sense, and I got the points about thinking differently [reframing]*". Likewise, in this statement: "*It will be challenging for me to create bigger solution spaces, as Einstein recommended, but it is a matter of training...I can also use reframing to find new themes and perspectives in my journalistic products. I have experienced reframing my view on other people's expectation of me.*"

Summary: Students might comprehend the act and the different types of reframing, but in the collages a majority of students demonstrate a poor understanding of the concept. Either the explanations have been unclear and/or the students need more guidance in working with reframing in life design problems.

Insights related to working with prototyping

Generally, prototyping seemed challenging to the journalism students. Yet, when asked what they experienced, the quantitative research says that 58% of the students believe that materializing can help you generate new thought and ideas, while 13% say it can help you develop new perspectives e.g. on your future. In addition, 27% state that they do not think that visualization is helpful at all. We have a similar result from the qualitative data.

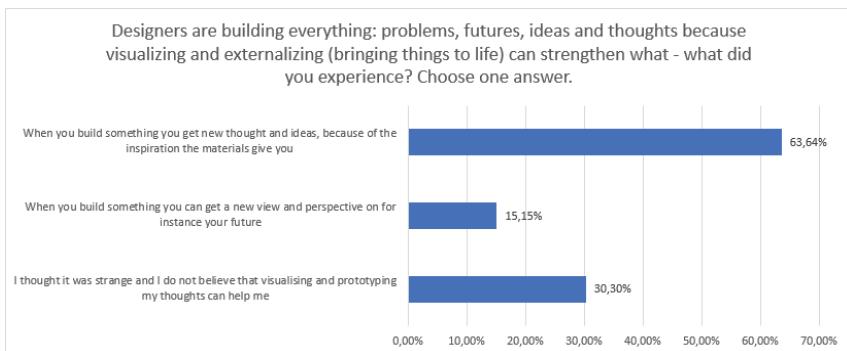


Figure 10. Questionnaire on materializing

Based on the qualitative data we can divide the students into three different groups with related statements. Some do not gain anything from the activity; some are sceptical but end up having (new) reflections, and finally some students experience that visualizing and materialization help 'making sense'. That is exactly the point and the main purpose of design thinking, prototyping and visualization: to bring back the senses into the understanding of the world, the future, a problem etc. (Lindgaard & Wesselius 2017).

- Group 1: low or no interest/effect – as seen in this statement:
"It was a challenge for me to do this exercise with a serious approach. I have a hard time really appreciating the learning outcome in this kind of work – it's a joke to me..."
- Group 2: little/medium interest/effect – as seen in this statement:
"In the beginning I was sceptical towards what I would gain from this assignment. However, I ended up thinking that it is a nice assignment for the purpose of reflection."
- Group 3: high interest/effect – as seen in these statements:
"... If you have any thoughts in your mind and you didn't know how to relate to them, I believe [making prototypes and collages] helped a lot."

"...I was surprised...I have been thinking about it, I have written about it, now I can also feel it, how I imagine the future, I would like...it gives me security."

It feels more tangible, words can sometimes be 'fluffy' – although I love words...and writing can sometimes be very "square"...I got inspired, which I think you sometimes forget, because you look for words in your own catalogue [pointing at her head].

Summary: Some of the students declare that they see no value in doing collages. Some have lesser, some have greater and more positive experiences of prototyping. Sometimes you can see from the collages whether or not the creator has had reflections, like in the one below that illustrates different paths for her future. For this mixed audience, maybe differentiated teaching with different options could be an idea.

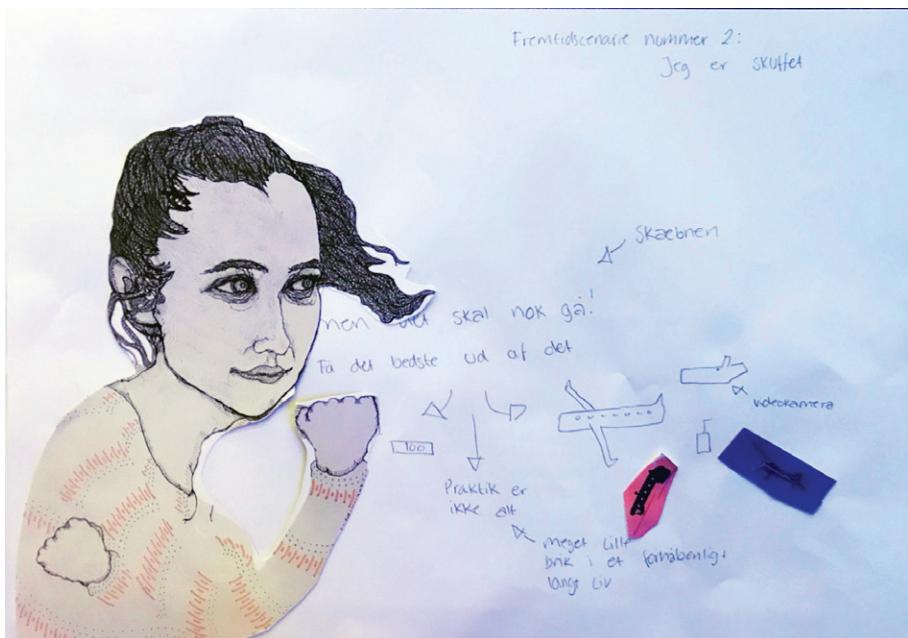


Figure 11: Collage illustrating three different paths for the future.

Insights related to working with the 4-Foci Model

From the qualitative research and from interviews the 4-Foci Model seemed to have a broad appeal. Some students like to go deeper into the inner focus and highlight the value of reframing situations or dysfunctional beliefs about themselves. Many are interested in the transformation from an inner to an outer, business perspective. It seemed a manageable challenge to define their value proposition, whereas reframing their inner focus (what they are good at) into an outer, business focus (something that adds meaning and value in an

organization) was a harder challenge; few managed this reframing. Although it was part of the assignment, no one mentioned the end-user's pain and gain (Osterwalder et al., 2014), which, of course, is understandable, if they have not been working with user needs etc.

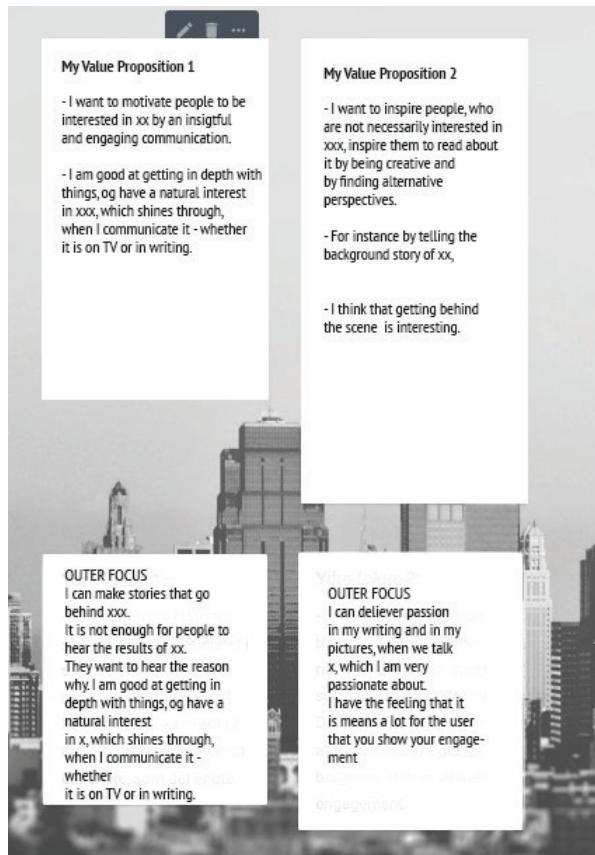


Figure 11. Transforming an 'inner focus' to an 'outer, business focus' is challenging for all students (text anonymized).

When asked whether they found the 4-Foci Model useful some of the student answered:

Yes. Actually, I think...I tend to keep my focus 'within myself'... [I will] look into what I am actually capable of, and how businesses and companies can also use [these competencies] – I will really focus on that."

Yes. I think it is very useful, in particular to reflect on how I add value for other people. I would like to work on that focus. I think it can be difficult to figure out how I can contribute for example as an intern.



Figure 12: Photo from workshop

Statements on the learning outcome

We asked the question: What did you learn from the workshop?

We have one answer from a non-participant:

"Spending time cutting and gluing posters is simply too ridiculous. Call it creativity, reframing, a new mindset or whatever, in my eyes this is not at all useful in order to prepare for an internship. It's a waste of time and resources."

We have different answers from participants:

"It was a bit challenging [to do the workshop]. I got frustrated at the fact that I had to describe myself. However, [I did learn about] the importance of identifying the problem, creating your settings, being aware of them and the boundaries you create for yourself, plus seeing the challenges that may not even be there..."

"Many [of the other peers] were very critical of the course, but for me (who was nervous about the internship application and the stress that follows) it was very rewarding. Many of the tools [teacher's name] mentioned, and the things we worked with helped a lot. [The tools] gave me more peace and a belief in myself. I was very happy with the course..."

"I think it has been really great... often, in a group of journalists, people are really good at thinking analytically and critically but sometimes they are too rigid. I often miss a little creative input and that people dare to think outside the box and turn things upside down."

The answers demonstrate that some of the students considered the workshop to be waste of time, whereas other students found it valuable referring to different activities and how to use them in their life.

Discussion

The workshop was useful to some of the students, that picked out individual assignments. Yet, a weakness was, that only half of the students participated. According to the Head of Internship there can be different reasons for this: Workshop attendance was not compulsory. Another reason might be that preparing for their internship is uncomfortable and some students do not like to work with 'an inner focus'. As Katznelson (2018) argue, young people have difficulties having a sense of themselves, and prefer e.g. to focus on the more practical issues of preparing an application. Finally, many students found the design approach to be 'too creative' and 'fluffy' and were critical of the very idea of 'designing your life'. As a student argued, "*It is maybe a little 'dreamy' to believe that this alone could give you eternal happiness – to find the meaning of life by being creative.*" This statement indicates a barrier in an implicit and limited understanding of 'creativity' as painting and knitting (insights from research). Likewise, we saw how the design activity 'reframing' was interpreted in the simplistic way: having a more positive outlook on life, which also demonstrates that at least some of the students have not reached a deeper understanding of the activities and the approach. These insights could indicate a need for more in-depth explanations and guidance in the workshop. A last reason for low attendance might be, that the students simple do not feel a need for seeing more perspectives and "tools to life's maze" (cf. Katznelson, 2018). In a follow-up questionnaire four weeks after the workshop, offered to all 100 students, some 67% (of 45 participating students) answered they think they will get a permanent job in journalism. This is of course a minor study, but maybe some or many students are optimistic in the sense, they think they will get a permanent job as a journalist. Yet, compared to recent surveys today only 30% of journalists have a permanent job in journalism (Danish Union of Journalists, March, 2019).

The above mentioned issues point to a need for more in dept research on the students' thoughts about the future e.g. future competencies in order to better meet this audience. Today, everyone needs creativity in their workplace and in their lives, not least journalism students, as they have to rethink their role and competencies as a future journalist in a radically changing media industry (Haagerup, 2017 Westergaard & Schultz, 2018, Allen, G. et al., 2015).

Conclusion and future perspectives

In order to help students build the skills of seeing more perspectives and creating new possibilities we offered a framework: an attitude and the 4-Foci Model. In the workshop the students were working within this framework and on different types of hands-on exercises from spotting signs of well-being, identifying role models and value propositions to building future scenarios and creating visual expressions that make a statement about themselves. The workshop included activities in accordance with Katznelson (2018) recommendations for young students and can be repeated in controlled experiments. The workshop was useful to some of the students, yet, many students did not participate.

The workshop points to a huge barrier, but at the same time it reveals a huge potential: The Life Design Attitude is founded on a view of human beings as creative individuals and co-creators of their life and of the world. In the future labour marked ‘you must be your own chief executive officer’ (Drucker, 1999). That means you will have *to create* yourself, you will have to *create* your life in a way that is meaningful *to you* (Greene, 1978, 1995). However, this perception of ‘creativity’ differs fundamentally from ‘creativity’ as a tool for good ideas or ‘creativity’ as painting or knitting, which was the dominant understanding of creativity among the students. Thus, the students’ understanding of creativity represents a huge barrier, but at the same time it reveals a huge potential: We should focus on starting to change or broaden the students’ understanding of ‘creativity’ and subsequently train them in how to use their creativity also in life.

Fluffy or not, Stanford University’s Design Program has trained more than one thousand students in design thinking and how to design their lives (Burnett & Evans, 2016, xxii). “Two doctoral students found that those who took the course were better able to conceive of and pursue a career they really wanted; they had fewer dysfunctional beliefs and an increased ability to generate new ideas for their life design (increasing their ideation capability)” (Burnett & Evans, 2016, xxii).

Thus, in order to adjust the course to the 100 journalism students, one option could be to abandon the design approach and offer a more traditional job application course and more business-oriented entrepreneurship courses. Another option could be to offer a more differentiated type of workshop, with different types of focus and exercises that could accommodate the very different types of students, some more creative than others. Or, we could continue offering the workshop as it includes activities in line with Katznelson (2018) recommendations for young students: focusing on an inner focus, seeing more perspective and getting ‘tools to life’s maze’. This would be a strong sign from the educational institution saying, these are important issues for you as a human being and as a future free agent. Lastly, a more radical option is to introduce the Life Design Attitude earlier in the programme. In another experiment we have introduced the Life Design Attitude to first year students in order to train this *attitude* which, we assume, will make the students better suited for the future as a free agent and for life in general.

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Preparing to Participate in Design Praxis: A Process for Students to Connect Their Design Agency to Everyday Living

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Abstract

Design students typically consider the agency of design as only making without accounting for the whole of design praxis. However, much of the value and relevance of design's agency is within its implementation and impact in the context of living. Design praxis depends on a continuum of designer, designing, and situated design. Yet, design education is not well equipped to orient students to critically consider a moral relevance of their design agency in terms of its implications within everyday living.

How might design educators facilitate consideration of design agency's moral orientation within the whole of design praxis? This paper presents a pedagogical process used by graphic design students to establish a reflexive view of their design agency as an intent generally understood as a set of principles guiding their participation in design praxis.

The paper outlines a critical view of praxis to establish a dialectical framework that organizes the process. This consideration of praxis incorporates aspects of Freire's critical pedagogy and Merleau-Ponty's intersubjectivist account to position a reflexively motivated design agency within the whole of design

praxis. This phenomenological approach permits wellbeing to provide relevance and value for a morally-oriented design agency oriented to a praxis of design situated within living.

The process' structure and methods are explained within its implementation among preceding and subsequent student inquiries. Then a brief qualitative assessment of the process' demonstrated potential to cultivate and clarify a moral orientation to designing according to a student's individual and cultural values related to wellbeing within everyday living.

Author keywords

Design Pedagogy; Design Agency; Design Praxis; Process Design; Everyday Living

Introduction

The horizons of relevance within the prospect of designing something must be drawn by the designer. Within a designer's work, a scope of consideration and intention for what he/she is making is inevitably formulated. The designer has the option to extend his/her intent only as far as the studio's walls, where the resulting form and its desired significance is sufficient. This horizon can also be placed much further beyond the satisfaction of a client, past the fulfillment of the user needs, into the systemic and collective realms of transformation and sustainable situated living. Regardless, the range of intent a designer establishes is ultimately determined by him/herself, whether passively or critically.

This pedagogical investigation is built upon this unavoidable aspect of a designer's work. The imperative of this investigation, viewed through a Marxist perspective, arises from two thoroughly integrated risks when a designer is not actively reflexive in determining the scope of consideration and intent for what he/she designs. The first risk is that an uncritically determined design agency can be exploited to achieve a design praxis that serves agendas that are not necessarily committed to the wellbeing of many individuals, communities, and environments. The second risk is the alienation of the designer from his/her design agency.

The central question considered is how can design educators cultivate such a reflexivity within the budding designers they work with. More specifically, how might they facilitate a process for students to consider their creative agency within the context of a self-determined moral orientation to design praxis? The pedagogical value of any response to these questions is the fostering of a more critical and reflexive bases to the application of existing and potential design approaches that target everyday living such as user centric design methodologies.

The pedagogic innovation investigated here is in direct response to a perceived tendency for design education to generally withhold (not wholly intentionally) students from developing a critical consideration of their design agency within

a framework of design praxis. Yet, this paper will not argue the extent nor mechanics of this pedagogic inclination. Rather, this paper engages with the imperative as it is inherently implied within its consideration of design praxis and an explanation and assessment of a particular response.

The pedagogical process presented here has been designed and implemented within a second-year graphic design seminar that investigates the theoretical and philosophical aspects of designing for visual communication. This review begins with a critical view of design praxis as related to everyday living and its implications for a moral orientation to creative agency. This view of design praxis in relation to creative agency will then be reflected within a dialectical framework that is used as to organize the design and implementation of this pedagogic process. This will then be followed by a brief qualitative assessment of the process' potential as demonstrated in its outcomes and reported learning. This paper's presentation of this process seeks to provide design educators with a viable model to replicate or augment as further iterations of engaging young designers with a critical consideration of their intent as a designer to begin formulating a moral orientation to their contributions to the world's living.

Design Praxis in the Context of Everyday Living

The section outlines a critical view of praxis to explain a dialectic between creative intent and impact. Freire's critical pedagogy and Merleau-Ponty's intersubjectivist account are used for this dialectic to operate as a reflexively motivated design agency within the whole of design praxis.

Praxis is commonly understood as action taken to achieve change. In the sociopolitical sphere it classically refers to an action in relationship to its effect of changing society. Praxis's basis of working for change has since been focused in the area of activism to be defined as "the way in which political, philosophical ideals are strategically put into activist practice to bring about material change." (Portwood-Stacer, 2013).

By transposing this latter view of praxis onto the practice of design we can define design praxis as a process beginning with envisioning potentials for change within a present situation for which artifacts are designed as devices to be strategically implemented and participate within the process of transforming the present toward an intended potential situation. This perspective incorporates Renato Troncon's consideration of designed artifacts as strategies. He states, "In this world, the most prominent casualty is the idea that, while an artefact is a mechanism, it is also a 'strategy' for the concrete and actual governing of the many forces that confront each other in a particular determined field." (Troncon, 2011). By making this "determined field" the context of everyday living we can then operate a coherent and situated considerations of design praxis.

However, this thought process does not indicate how design educators can engage students in considering design praxis within the context of their own emerging creative agency. This is where Paolo Freire's relatively simple definition of praxis provides a manageable structure for organizing an effective process toward this pedagogic goal. Freire defines praxis as "reflection and

action upon the world in order to transform it" (Freire, 2000). This view of praxis sets an accessible agenda for students to reflect on how they want to act as designers upon the world to promote change.

In establishing the context of everyday living as the field of "reflection and (design) action upon the world" we are able to further engage the phenomenological basis of Freire's critical view of praxis by identifying process of everyday living as the "lifeworld" that Merleau-Ponty's intersubjectivist account of praxis outlines. This account extends the relevance of design praxis beyond the sphere of lived experiences where designed artifacts are merely perceived and experienced. Merleau-Ponty's consideration of praxis involves the notion of an "interworld" between people that is collectively or intersubjectively created as shared meaning that results from the interactions consisting of actions and speech/language (Hayson, 2009). This account of praxis applied to design permits us to consider the value of design to extend beyond the capabilities of a designer's creative agency into the "interworld." Here we can expect design to become situated within a daily living comprised of interactions between people that are facilitated or governed by these artifacts. This extent of design of praxis includes the strategic participation of design artifacts within the transformation of the present toward an intended potential. This impact resulting from designed artifacts requires the designer to operate an intent that reaches beyond an artifact and its planned function into an interworld of shaped by the everyday uses of the artifact.

Because phenomenology combines individual experience with the process of society, an intersubjectivist account of praxis connects a designer's creative agency to the social world of everyday living. This link explains how a designer's agency to intentionally create artifacts, that are experienced and used widely by individuals who interact subjectively to the extent of forming a shared reality, can become responsible, to some degree, for shaping a new reality. As a result, we can view design praxis as not limited to being a technical practice but rather a reflexive participation in a shaping of the world that is motivated by intention for envisioned impact. This reflexive orientation to design praxis has been involved in some methodologies such as critical technical practice (CTP), first developed by Phillip Agre who "demand[ed] that engineers and scientists infuse their work with a critical reflexivity..." (Banks, 2016).

This paper's pedagogic investigation focuses on how we might engage a design student directly with considering the dialectic of creative agency and creative impact as an inherently reflexive process. With this focus we can consider how to prompt a student's critical reflection of how he/she wants to shape the world. This, in turn, can motivate his/her creative agency with a reflexive participation in a design praxis that is morally oriented by his/her intent for impact.

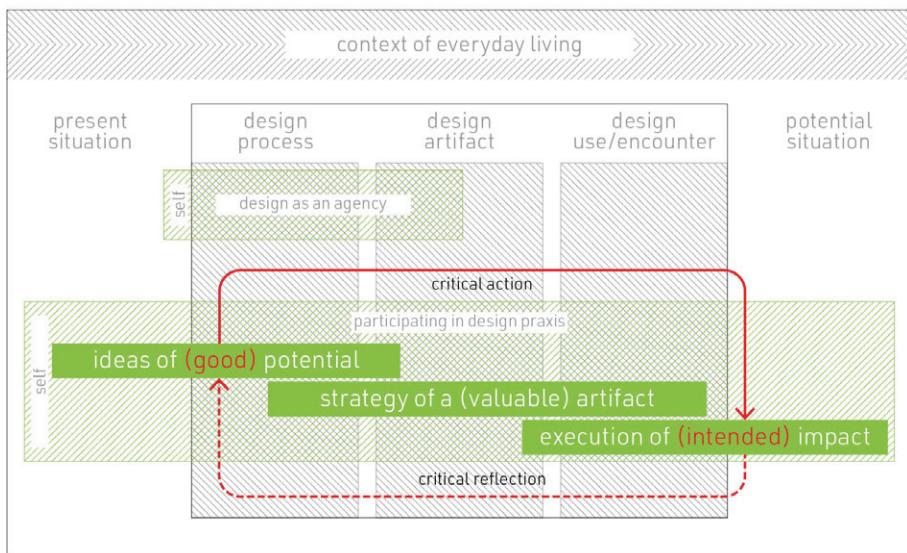


Figure 1. A continuum from present to potential wherein a creative agent (self) orients to either design agency solely or the whole of a reflexive design praxis (three phases).

Implications for a Moral Orientation to Design Agency

This section examines how a design student's consideration of reflexive participation in design praxis requires critical awareness of his/her individual and cultural values and beliefs in regards to a critical reflection of how he/she wants to shape the world through design. Here we will look at how the incorporation of Freiri's critical pedagogical approach can activate moral structures within a student's critical reflection that will enable him/her to participate in a reflexive design praxis while avoiding simply contributing to a technical praxis.

Typically, a design student's scope of understanding and applying his/her design agency is confined to the design process and the prototyping (not full production) of a design artifact. This limitation is understandable given the basis of students applying themselves to hypothetical projects developed by their instructors along with the "suspension" of the school from the "real world." However, these circumstances do not serve as a justification for withholding students from considering their participation in the whole of design praxis. It can be argued that design education's mission to prepare students to become productive designers who participate in design praxis obligates it to develop not just the students' capacity to design artifacts, but also a basis of intent within his/her design agency that is oriented to a scope of design praxis that extends beyond the design of an artifact.

This mandate for design education is increasingly being serviced with programs, curricula, and faculty instilling ethical orientations to environmental and social considerations. However, such developments, tend to promote established agendas of critical action while not engaging the students in critical reflection as a component of their formulating in the terms of their own values

and experiences their own intent for impact. As a result, the design praxis serviced is confined to being a technical practice as opposed to a reflexive participation. This excluding of students from the formation of intent can, according to Freiri's critical pedagogy, lead to their orientation to the design intent being determined within a political hierarchy of the educational institution (i.e. a university). Without relying on Marxist philosophy's construct of alienation, this paper advocates for design education to orient its students to a reflexive critical praxis and not merely a technical practice.

This proposition has led to the application of Freiri's critical pedagogy with its dialectic organization of critical reflection and (intended) critical action to prepare a designer to participate in a reflexive design praxis. This is to help students orient their design agency to intentions to promoting positive impacts within situations of everyday living as informed by their own values. This synthesis of intent and impact creates a moral demand upon a designer's participation in design praxis. This is because any intent must be built upon the agent's notion of value. The designer must somehow determine what is good and what is not in order to form intent.

This is the function of a critical reflection by the designer; he/she must critically consider the situation and potentials at hand to establish an intent capable of creatively investigating what forms of intended potential could take and ultimately commit to one. The field of behavioral and cognitive sciences has established tested perspectives that link "moral intuition" with intentionality. This link implicates an inevitable moral basis of a designer's intent. Cognitive research supports that people's intuitions behind their intentional action rely on a comparison between the actual world and certain alternative possibilities that are fundamentally influenced by their moral considerations (Knobe, 2010).

To further consider the need for design education to somehow foster the formation of morally oriented intent within design agency we can draw further from Renato Troncon's consideration as design artifacts as strategies. In his consideration of everyday living he outlines the influence of design praxis as occurring within, "...a certain 'vital sequence' [that] exists along the chain of an event, and that it cannot be dissociated from the variety of media - artefacts or others - in which it hinges" (Troncon, 2011) With this we can see that the design of artifacts can, and should, be motivated by an intent dedicated to potential "vital sequences" in everyday living. Troncon also proposes, "If designers were to read theoretical biology, social history and the philosophy of technology – see, for example, Stiegler – they would be greatly helped in their own work, and the universities too would offer a better education." It is a reasonable conclusion to understand that he anticipates a designer to gain relevant insight to facilitate a more developed moral assessment of what constitutes a vital sequence with in a person's or community's daily life.

However, a designer's critical reflection should not be wholly determined by the offerings of biologists or philosophers. Ultimately, the matrix for forming design intent resides within the designer him/herself. A phenomenological view can only rely on a designer's individual and cultural perceptions and experiences to organize the moral determination of his/her intent. Thus, it is

necessary to implement a critical pedagogical approach to engage a student's individual and cultural values in providing a moral orientation to the intent formulated when considering their creative agency within the context of design praxis. As stated earlier, the role of a critical reflection is to bring one's own perceptions and experiences forward into the deliberations of forming an intent to be pursued by the ensuing critical action.

A Dialectical Framework

We turn to the critical pedagogy outlined by Freire to help organize this reflexive consideration by a design student. This pedagogy employs a dialectic process between the functions of critical reflection and critical action that imply. This dialectic is formed by the critical reflection of an agent locating the determinants of the present situation to imply an intent for critical action that will promote a potential situation of reality that will in turn prompt new critical reflection that inspires new actions and so on. This dialectic serves a design praxis capable of shaping everyday living given that the whole of everyday life is not determined by one designer but by many design agencies continuously facilitating the innumerable vital sequences that are constantly unfolding into reshaped interactions among the individuals who collectively are always making sense of the shared experiences.

Because of the inherent relevance and inevitable necessity of this dialectic within design praxis the design of this pedagogic process was organized by a framework involving this dialectic process. This framework was developed by integrating the scope and components of a reflexive design praxis. The scope involving two realms of individual aspiration and the living world as intended was mapped across the two areas of design agency and everyday living (see figure 2).

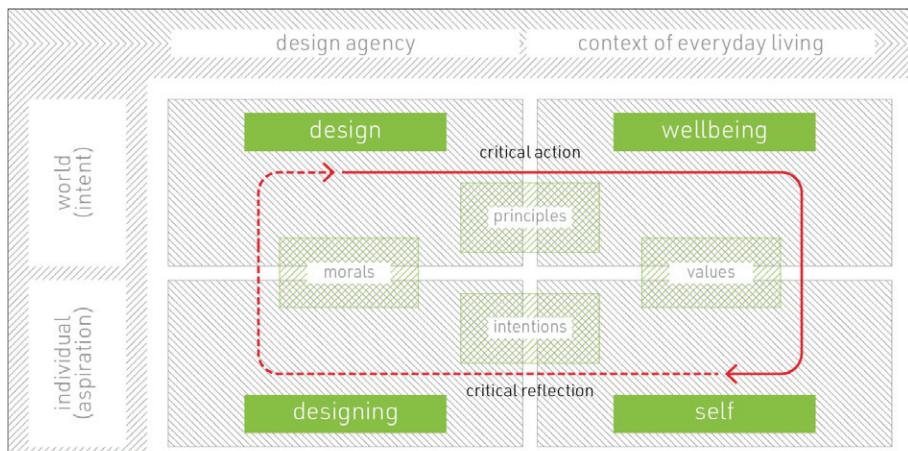


Figure 2. The scope and components of a reflexive design praxis that organize a structure of four conditions of self, designing, design, and wellbeing that prompt the values, intentions, morals, and principles within a dialectical process.

This integration of the scope and components of a reflexive design praxis establishes the four conditions of self, designing, design, and wellbeing. The individual capable of aspirations for living in the context of the

everyday is recognized as a "self." As this "self" engages a design agency the process of designing begins when a level of intent is generated by critical reflection. Following this the designing self continues towards achieving a design artifact. Given that the completion of a design artifact requires a deliberated course of action we can see a moral intention is needed. The morality of the design is determined by the prospect of enacting this design within the context of everyday living to create value. This critical action of situating design is guided by principles derived from the morally oriented intent of the designing self.

It can be assumed that a design praxis being considered within a design education program can be justified to be defining an intended impact of changing the world for the better as being considered in terms of promoting forms of wellbeing as determined by the given situation. This basis of wellbeing connects back to the self through the framework of involved values to then begin another iteration of the dialectical process of a reflexive design praxis.

A Pedagogical Process

This framework of components and relationships indicate a sequence of focused considerations that a design student can proceed through to facilitate a consideration of their potential for creative agency within the context of a self-determined moral orientation to participating in design praxis? Pulled forth from this framework are a set of reflective and critical tasks that contribute to a cumulative process of identifying relevancies and clarify value and ultimately moral intent. Although the process was designed to function in a linear fashion, students were encouraged not to limit themselves to this project but to include many instances of "jumping ahead" and "revisiting" among the five methods.

The first method is located in the condition of "self" where it begins a process of critical reflection. The second method continues this critical reflection by beginning the formation of individual aspirations as the process moves into the condition of designing. Here, the third method positions the aspirations as design intentions becoming morally oriented as the reflection proceeds into the condition of design. Here the fourth method begins situating these intentions as forces within design's capacity for critical action. As this intended critical action is pushed forward into the last condition of wellbeing guiding principles for this critical action as applied within the context of everyday living are established by the student. These principles for his/her designing, design, and situated design is anticipated to synthesize the students' values, intentions, and morals to the extent of proving, to a limited degree, a reflexive orientation of his/her design agency to the whole extent of design praxis.

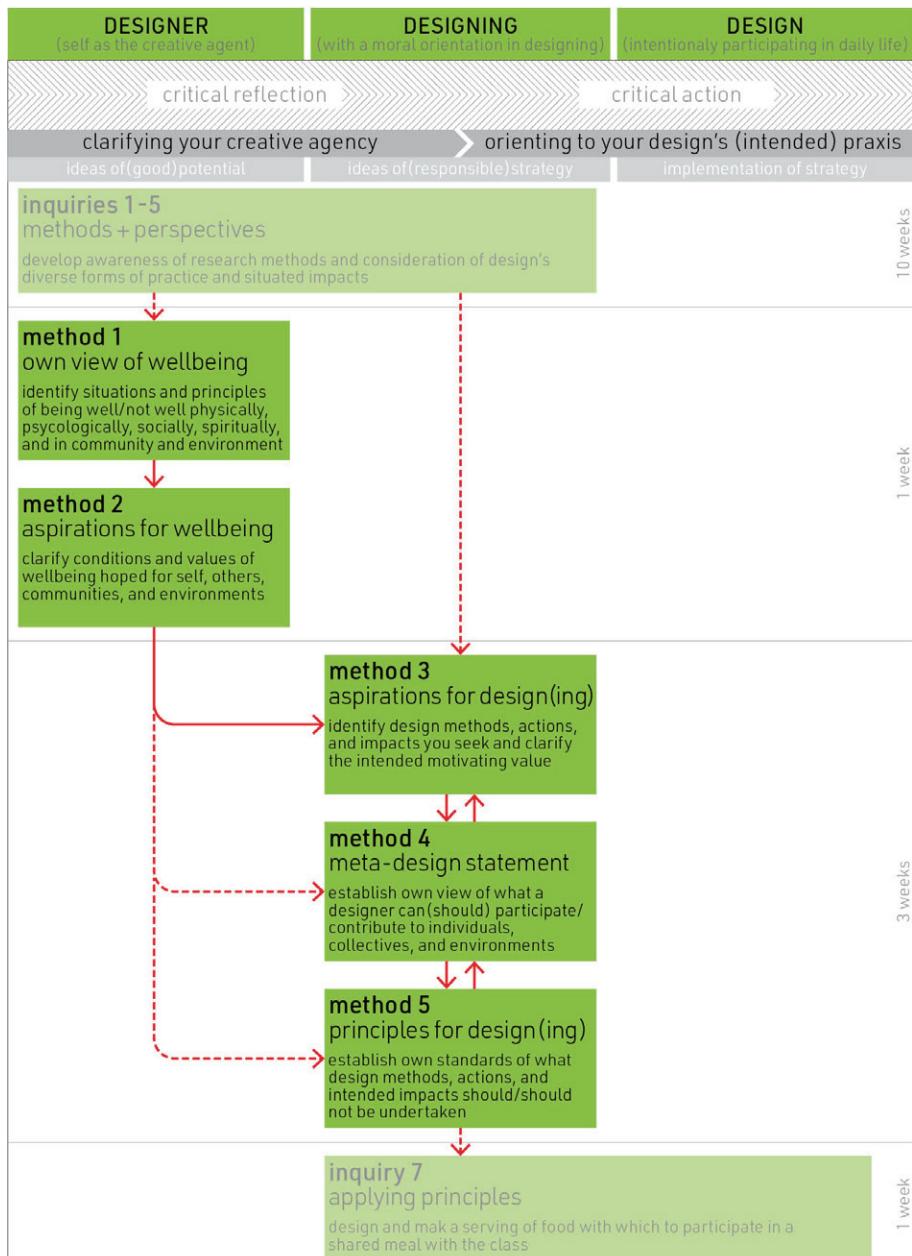


Figure 3. The process' structure of five methods shown here as it was implemented as the sixth of seven inquiries within a fifteen-week seminar. The process' first four methods drew upon the insights gained in the first five inquiries of the seminar. The subsequent seventh inquiry served as a design praxis opportunity for the students to participate in as informed by a framework of values clarified and intent formed in the process.

Outlined below are the components and considerations of the process' five methods:

Method 1: Considering one's own view of wellbeing.

Students were prompted in this method to research situations and principles of physical, psychological, social, spiritual, community, and environmental wellbeing. Also, identifying factors and states of being unwell was suggested. Students were encouraged to use both secondary research methods and primary methods of investigation by applying some of the methods used in some of the previous inquiries of the seminar. The value of primary methods was explained as allowing wellbeing to be understood as contextually oriented within the conditions, experiences, and actions of situations of daily living.

Method 2: Clarifying one's own aspirations for wellbeing.

In this method students were asked to reflect on the insights into the situations of wellbeing they developed in the first method. They were prompted with a framework of considering wellbeing in the contexts of themselves, other individuals, communities of people living together, and environments (natural and/or built). For each of these contexts the students were asked to identify what conditions and they could hope for and the value enabled by these conditions. This method could lead the student to identifying emotional stability as a condition for self for the value of contentment and confidence, or it could recognize collaboration as a community condition actualizing the value of cooperative interdependence. The specific intent of this method is to have each student consider themselves as one who maintains values and relevant concerns for how things are in the world as experienced and acted upon by themselves and others as individuals and collectives.

method 1: own view of wellbeing		method 2: aspirations for wellbeing	
forms of wellbeing	situations + principles	hopes for wellbeing	conditions + values
physical	Investigation findings	self	reflection findings
psychological	Investigation findings	others	reflection findings
social	Investigation findings	communities	reflection findings
spiritual	Investigation findings	environments	reflection findings
community	Investigation findings		
environment	Investigation findings		

Figure 4. The format of the first two methods to organize a student's consideration of wellbeing as a potential for themselves, others, as well as collectives, and environments.

Method 3: Identifying one's own aspirations for design(ing).

This method was developed to organize the students' repositioning their identified aspirations for wellbeing from method 2 as aspirations of designing and design. This repositioning of aspirations was to reframe their values and conditions for wellbeing as intended design impacts that can be serviced by

their design agency. This was facilitated by organizing their consideration of their design agency within the conditions of methods of designing, actions of design, and impacts of situated design. Within each of these conditions the student was asked to identify multiple aspirations that involved the application of their design capabilities. This was prompted with the completing of the statement, "As a designer I want to ..." For example, a student might reposition his/her aspiration for community wellbeing found in collaboration as an aspiration for a design method. This student might state, "As a designer I want to collaborate with community members." He/she might continue this repositioning of aspiration into stating a design action aspiration stated as, "As a designer I want to co-create a community school." This repositioning of these aspirations from concerns for wellbeing into the conditions of design required each student to draw upon their awareness of design methods, actions, and capacities for impact that the previous five inquiries of the seminar considers as well as the learning from other courses and their own experiences.

method 3: aspirations for design(ing)

aspects of design	capabilities	values + intentions	
methods	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...
actions	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...
impacts	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...
	as a designer I want to ...	why ...	why ...

Figure 5. The process' third method to reposition the individual's aspirations for wellbeing as design aspirations within the design aspects of methods, actions, and impact. Each repositioned aspiration is then investigated with the recursive method of laddering to uncover the intentions and values motivating each of the design aspirations.

Then for each of these repositioned aspirations the student is directed to uncover the values and intentions motivating these aspirations. The design thinking method of laddering, often used to identify latent values and concerns, was employed as the simple act of recursively asking "why" starting with the stated repositioned aspiration. The student's statement of, "As a designer I want to co-create a community school." is questioned with, "Why do I want to co-create a community school?" This leads to an intention of, "I want to do this because it will enable a community to develop greater capacity for self-sufficiency." This intention can then be questioned with, "Why do I want to promote self-sufficiency?" The response to this can uncover the value of self-empowerment. In turn, a third "why?" might uncover a more fundamental intention of designing to promote self-determination.

Once the students started repositioning their wellbeing aspirations as design aspirations and uncovering some of the motivating values and intentions they were provided with three rubrics for assessing more generally,

their design aspirations (see figure 5). Each of these rubrics organized a consideration of one's design capacities, values and intentions as applied within their design agency and its orientation to design praxis. The student's participated in a facilitated class session of positioning themselves within each of these rubrics as they felt they currently were and where they wanted to be in the future. This more generalized consideration of their design agency, as intended, generated a view of themselves as designers who design for impact. This view provided a point of departure and frame of reference for the fourth method.

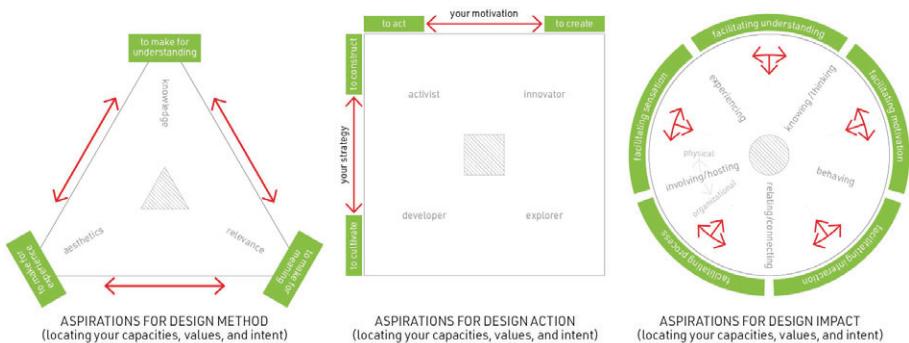


Figure 6. Three rubrics used for the students' assessing their current and desired future intentions motivating their design agency as positioned within the whole of design praxis.

Method 4: Designing of design as a meta design statement.

Based on the insight gained from identifying some specific and general values and intentions motivating their design methods, actions, and impacts each student was asked to design a coherent definition of what it is a designer (him/herself) does as a designer. The outcome of this method is a meta-design statement that clarifies, in general terms, his/her perspective of what a designer can, and should, do and its relevance and value such as this design's implication for individuals, cultures, the planet, or other context of wellbeing.

Method 5: Establishing principles of design(ing).

The final method in this process engaged the students with using their meta-design statements resulting from method four as a foundation for developing a set of three to five principles capable of morally guiding their design intent throughout their participation in design praxis. The students were commissioned in this method to establish moral standards with these principles to provide an orientation of design intent within multiple diverse and unforeseeable future situations of design praxis. The students were asked to draw from the previous four methods of the process to identify what is valued in their design's implications for wellbeing.

The method required the students to develop an understanding of a principle's role of establishing thresholds for what is acceptable and

unacceptable for design. The students had to come to understand a principle's basis of requiring, thus defining, a necessary relationship between one's design agency and the conditions of design methods, actions, and impacts. This understanding required their being able to distinguish between a strategic design objective and a moral design intent.

To support the students throughout both this method five and the previous method four many examples of design principles, ethical standards, and manifestos were presented and discussed. The model of principle provided in the following example of a principle of moral design intent: "My work as a designer should always strive to facilitate, enhance, or celebrate the dignity of each individual who encounters and engages with what I create. What I design should not contribute to a meaning or experience whereby a person's dignity as a human is questioned, challenged, or diminished."

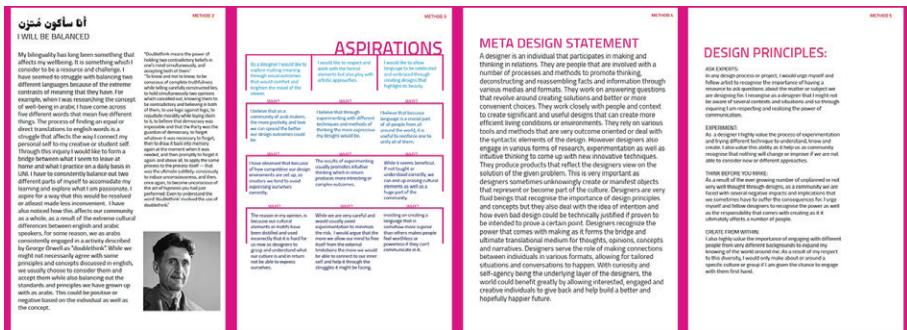


Figure 7. A sample of the processes' outcome of a students' aspiration for wellbeing (method 2), design aspirations (method 3), meta-design statement (method 4), and design principles (method 5) (*shared with the permission of the student*).

The Outcomes and Apparent Learning

Because this pedagogical process has produced outcomes generated from students' critical reflection and considered critical action an assessment of these outcome and the apparent learning is useful. However, since this process has only been designed and implemented as an initial iteration involving more introductory level students this assessment is not an evaluation of the level of learning achieved with this process, but rather a brief qualitative review of some of the demonstrated potential of this approach to servicing the pedagogic goal of engaging students with a morally-oriented consideration of their design agency as participating in reflexive design praxis.

This assessment will briefly reflect on both many of the collected process outcomes and on some of the expressed learning reported in a learning self-assessment completed at the conclusion of the process. The outcomes featured a document presenting the completed five methods. The learning self-assessment involved the students reflecting on what they felt they learned about wellbeing, its relevance to their designing, and how their newly formed meta-design statements and principles are useful to themselves as design students. This assessment is structured around two areas.

The first area is the overall goal of the process to facilitate a consideration for the potential for one's creative agency as being morally oriented to design praxis. What is demonstrated is a wide range of achievements that generally span from identifying value and formulating intent for their design agency for creating designed artifacts with a complete lack of considering the full extent of praxis while some generated coherent articulations of intent within a design praxis involved with shaping everyday living. One student included in her meta-statement, "Designers serve the role of making connections between individuals in various formats, allowing for tailored situations and conversations to happen." This student was able extent this view of design into a morally oriented principle that included, "I recognize as a designer that I might not be aware of several contexts and situations and so through inquiring I am respecting and realizing the power of communication." Another student reported in his/her learning self-assessment that, "[The process] revealed to me what my moral standards are."

Briefly concluded it seems the process in its first iteration was able to engage some of the students reflexively enough in considering design praxis to have achieved a moral orientation for their design agency.

The second area of assesses the processes potential for enabling students to incorporate considerations and understandings of wellbeing within the formulation of a morally oriented design intent. This review looks at how the developed insights within method 1 seem to be involved in the meta-design statement resulting from method 4 and the principles developed in method 5. As is the case with the first area of assessment, what is demonstrated is a wide range of achievements. Some students created a clear view of conditions, values, and intentions of wellbeing that was almost fully neglected by their design aspirations that only engaged their design agency to create more aesthetic merit within their design work. Yet, other students constructed a near seamless repositioning of their aspirations for wellbeing as design aspirations that implied the eventual design principles established.

The reported insights shared within the learning self-assessment also indicate a range of perceived relevance between wellbeing and a moral orientation to design intent. Some students were so focused on design as only being an agency of creating work that the cited relevance of a designer understanding wellbeing was that the more well a designer is the better his/her work will be. This was contrasted with a number of students being able to, as a result of the process, see the relation between wellbeing and a moral orientation of their design agency. One student reported, " This [process] changed my understanding of what a designer might do because it showed how important wellbeing is, therefore, the process changes because I have to take into mind wellbeing and how it would affect people within my process of creating which leads to different outcomes."

Conclusion

In conclusion, the process has demonstrated some promising pedagogical potential that warrants further development and iterations of this process. If this process were to be implemented among a higher level of students its assessment would benefit from including two further areas of review. One is assessing to what extent students could of conceptualize a continuum of

design praxis as serviced by the integrated conditions of designing methods, design actions, and situated design impacts. The other additional area of assessment would be the student achievements of using the identified motivating values and intentions of their stated design aspirations in method 3 in the development of a moral orientation to their design agency as established in the meta-design statement of method 4 and the principles of method 5.

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Professional Papers

Design Teaching Processes for Circular Economy – MUKI Project

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Abstract

How can design thinking and design methods support education in speeding up transition to a more sustainable society? The necessity to make a shift from a linear “take, make, consume and dispose” model to a circular model is obvious. Policies and action plans towards circular economy have been adopted globally. The Finnish Innovation Fund Sitra (directly accountable to the Finnish Parliament) funded several projects on all educational levels to promote education of circular economy in Finland in 2017-2019. Sitra has been working to develop an ambitious societal model for the near future organized around the themes of sustainable wellbeing and development (Cook 2018, 14). The requirements for funding were cooperation between universities, Open Studies and the development of education as a permanent practice. In autumn 2017 design departments of three universities, Häme University of Applied Sciences (HAMK), Savonia University of Applied Sciences and Metropolia University of Applied Sciences received this funding and the Design for Circular Economy project MUKI (in Finnish Muotoilua kiertotalouteen) was initiated. All the above-mentioned universities have experience in sustainable design teaching. Earlier, the focus has been on providing a holistic approach to sustainable design challenges and life-cycle thinking. This mutual teaching project enabled utilizing the synergy of gained knowledge and experience of the three universities in the context of design teaching for circular economy. Each teacher had their background in design and design education, yet all of them had also different expertise. This paper presents the results of the MUKI project (Design for Circular Economy). The teaching project included two Bachelor courses and one Master level course with a total of 25 ECTS. The project discovered three important aspects in enhancing education in circular economy: well-functioning cooperation in simultaneous teaching, design thinking methods and the visualization of circular economy models.

Author keywords

circular economy; sustainable design; design thinking; teaching; methods

Introduction

The concept of circular economy is multifaceted. Kirchherr, Reike and Hekkert (2017) have found 114 different definitions for circular economy in peer-reviewed journals and in policy papers and reports. According to Ellen MacArthur foundation several thoughts are behind the concept of circular economy (2017a). One of those is Braungart's and McDonough's ecological manifesto of cradle to cradle thinking (2009, 103-115), where material has two cycles: biological and technical. For the students and teachers coming from different backgrounds, it was important to share understanding and theories and as well as to present real-life cases to clarify the topic. To avoid the use of circular economy as a superficial term without deeper understanding, the emphasis was on examples of students own living environment and the cases presented by the companies. In the study projects, the students had to consider circular economy beyond just recycling to business models and production system level.

Well-functioning Cooperation Simultaneous Teaching

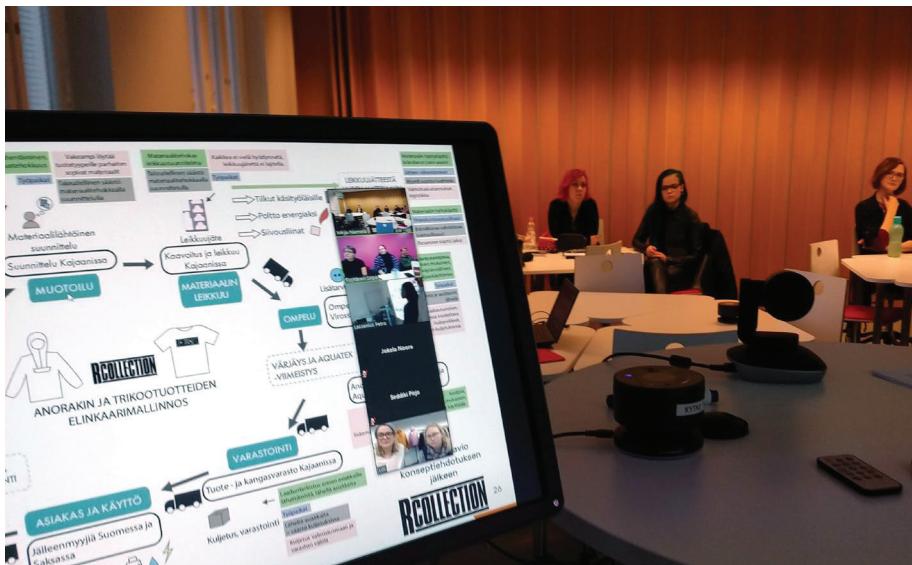
The first problem to be solved was how to enable well-functioning cooperation between teachers from different universities. The planning for simultaneous blended learning was made by using the Carpe Diem method (Salmon & Wright 2014). This method is defined as a Learning design method. It is a good example of a new context where term the "design" is used. Carpe Diem is mainly used for facilitating online learning development. As a method, it is very similar to other design processes with agile development, rapid prototyping and storyboarding.

When planning the curriculum, the teachers met three times by visiting each other's home campuses. Otherwise, the whole curriculum planning was carried out via Skype for Business and Zoom web conferencing tools and using Microsoft Teams platform.

In simultaneous online teaching, well-functioning technical equipment is very important. Proper microphones and loudspeakers as well as large smart or whiteboards are crucial during the pleasant and motivating educational moments (Picture 1). Large smart boards and high-level microphones enabled the feeling of presence, although participants were in different campuses.

The face-to-face meetings were significant for getting to know each other, sharing knowledge and especially for finding the common way of working. In the first campus meeting, the teacher team had a one-day Carpe Diem workshop facilitated by specialist. The workshop was very successful, and the teacher team was able to make the most important decisions about the MUKI project.

In subsequent campus and distance meetings, the teacher team could focus more on the practical course planning. Simultaneous distance teaching is both a challenge and an opportunity. The teaching demands a very precise manuscript for each contact day and for the whole course. For simultaneous teaching, the teacher team made several rapid tests via Zoom to make the educational moments as smooth as possible.



Picture 1. Zoom web connection. Savonia and Metropolia student team is presenting online life cycle visualization and HAMK students and company representatives are listening.

MUKI project

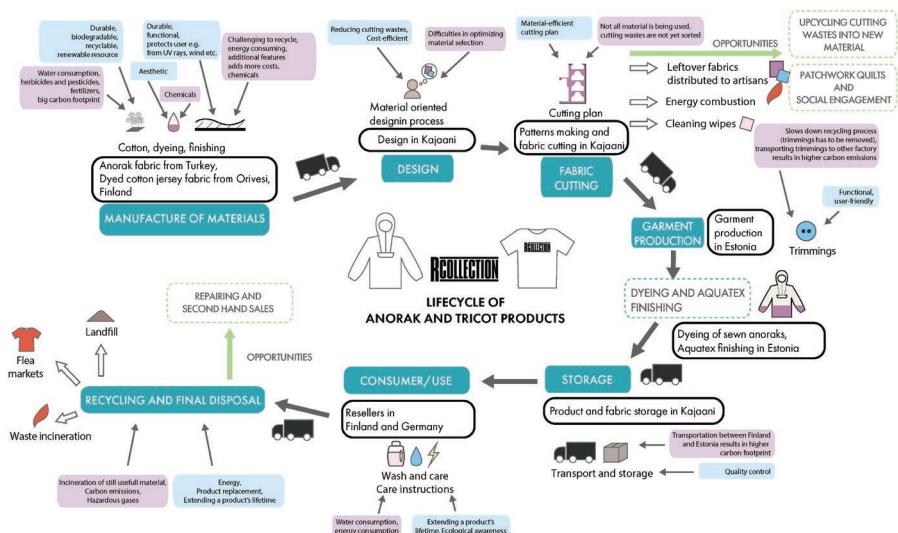
MUKI project was carried out with three Universities of Applied Sciences almost 400 km apart from each other, HAMK in Hämeenlinna, Metropolia in Helsinki and Savonia in Kuopio. The course package consisted of three courses:

1. Design for Circular Economy (10 ECTS),
2. Design Concepts for Circular Economy (5-10 ECTS) and
3. Transition Design (5 ETCS).

In the first course, Design for Circular Economy, the main goal for the student team was to find an everyday challenge and to modify it as a new sustainable solution. Course consisted of different design theories and methods. For example, the students worked in small teams exploring different concepts of sustainable development such as ecological design, social design, sustainable design and circular economy. The students familiarize themselves with different theories and methods of design and sustainable design. One of the methods was

sustainable life cycle thinking where dimensions of sustainable development are visualized and discussed during the product life cycle stages (Niemelä 2010, 198). As an outcome, thirteen student teams presented improved design solutions to circular economy ranging from food production to leasing of design items and from cosmetics business to clothing industry.

In the second course, Design Concepts for Circular Economy, the design methods weighted more on the co-creation and service design methods. Three companies introduced real life sustainability challenges to solve, the students worked with problems concerning circulation of materials. The student teams focused on all four loops of the circular design model (RSA 2016, 14), the design for longevity, the design for services and the design for re-use in manufacturing as well as the design for material recovery. An outdoor garment company R-collection had a need to improve the use of waste materials in the pattern cutting process (Picture 2). In a fabric company Foxa, the problem was to develop the technical fabric recycling process and to find new recycling targets or services for the company's second-rate fabrics. Main task was to find new use for those fabrics, which did not fulfill all technical requirements. The third company presented the problem of reusing the PET polyamide material of used beer barrels of an old and big Finnish brewery.



Picture 2. Sustainable life cycle of fabric cutting waste. The main life cycle is presented in the middle and environmental impacts and improving targets are marked with blue and red.

The third course Transition Design was more academic research work on Master level based on a small study of circular economy challenges in the community or workplace.

This pioneering course package (25 ECTS) on Bachelor and Master levels was open for all the Finnish university students. The course students represented 5

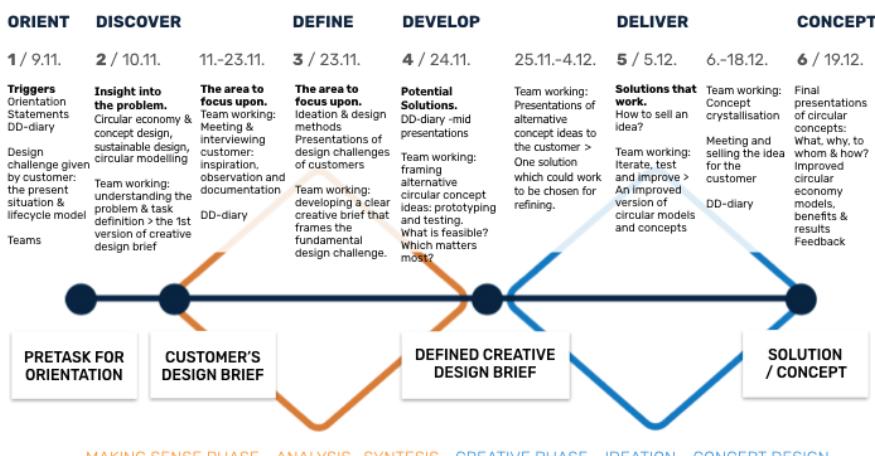
design disciplines and 2 other disciplines; business and engineering bringing also the cross-disciplinary approach and its benefits to the learning process of the teams.

Double Diamond as a Design Thinking Method and as a Pedagogical Solution

Various design thinking methods have been developed for decades for different organizations dealing with open, complex problems (Rowe 1991; Cross 2011). There are several visualized models to help stakeholders in problem solving, one of which is the Double Diamond. For MUKI project, this was a practical model being clearly visualized and easily understandable.

The design thinking model Double Diamond (Design Council n.d. 2016) structured learning and worked as scaffolding for entire education processes. This model forced the students to go through each stage of the design process from insight into the problem to the final solution following the steps of the model: discover, define, develop and deliver. During the process, several versatile design methods and tools were used to get students deeper into the almost unmanageable challenges and problems. The use of this common model clearly visualized structure and harmonized learning making communication easy for all.

In the first and second course, the Double Diamond model was used also as a structure in the teaching process (Picture 3). The model can be divided in two main phases as modelled diamonds: making sense and creative phases. As a pedagogical solution, the phases of the course were divided into five sections: orient, discover, define, develop and deliver.



MUKI DOUBLE DIAMOND DESIGN PROCESS TIMELINE

Picture 3. Double Diamond timeline of the second course Design Concepts for Circular Economy (Pakarinen Laura 2019, applied Design Council 2016).

In Chart 1 the aims, methods and assignment of the first and second courses are described according to the Double Diamond phases. During the first course, the design challenge was to improve circular economy problems of everyday life. In the second course, the challenge was to work with sustainability problems of companies concerning circulation of materials.

DD PHASE	AIMS	METHODS	ASSIGNMENT	CHALLENGE : CONCEPTS FOR CIRCULAR ECONOMY
ORIENT	Knowledge of sustainable development	<ul style="list-style-type: none"> • Flipped class room • Team working • Individual working 	Me and sustainable development: Statement and visualization	
DISCOVER	Understand different concepts of sustainable development Understand the phenomenon of circular economy Understand phases of product/service life cycle Understand sustainability in a product/service	<ul style="list-style-type: none"> • Mind mapping • Visual methods • Observation, benchmarking • Field working • Post-it mapping • Brain storming • Learning café • Mega trend cards • Visualizing life cycles of products/services 	Concepts of sustainable development, sustainable design and circular economy Sustainable life cycle thinking	
DEFINE	Find challenge in everyday life Understand meaning of brief	<ul style="list-style-type: none"> • Creative design brief • Storytelling • Storyboards 	Challenge from everyday life or company (Concept assignment)	
DEVELOP	Test and develop insights and ideas Application of knowledge and skills	<ul style="list-style-type: none"> • Design scenarios • Making videos • Visiting companies • Three concept ideas • Compare sheet 	Comparing three concept ideas	
DELIVER	High-quality presentation material (visual and verbal) Reflection /self-reflection Present and analyze the process Understand design process and sustainable design, sustainable life cycle thinking	<ul style="list-style-type: none"> • Problem solving • Mock-ups • Prototypes • Diagrams • Models • Improving of life cycle by visualizing • Modeling circular economy • Pitching concept • Presenting 	Final solution of the concept Process Portfolio / Double Diamond diary	

Chart 1. The first and second courses' aims, methods and assignments divided by the Double Diamond method.

All the time students were also encouraged to use varied design and visualization methods especially in the first course. One example of the visualization methods was a storyboard (Picture 4). It is a tool, which improves students' understanding of different situations and contexts (Bella & Hanington 2012, 170-171). The students used the storyboard technique both in the beginning of the design process and in the end of the process. In the beginning, the storyboard method helped to make sense of the challenging problems and, in the end, to explain the whole design concept idea.



Picture 4. Visualization method from the first course. Storyboards of three student teams.

The discover part of the model focuses on divergent thinking. Preliminary assignments and learning café method functioned both as initial orientation and trigger for the whole course (Chart 1). The purpose of this part was to stimulate both students' creativity and knowledge of circular economy. During the discover part of the Double Diamond process, the students had to do a lot of research, find out existing solutions and make first drafts of life cycles.

Before the Develop phase, one important task was to make a clear design brief that frames the design challenge. The creative design brief is a visualized document, where the student teams had to define the goals and the context of the challenge (IDEO n.d.). The first diamond, discover and define, is crucial for a good design brief. If the students did not focus enough on it, they even ended up solving a wrong problem.

In the second diamond, during the Develop and the Deliver phases, the design challenge was resolved through design methods. The teams worked with the product life cycles, analyzing, conceptualizing and improving them. Each team developed three concepts for different contexts of which one was developed for the final solution. In this part of model more weight is placed on convergent thinking. The students found discussions in teams and defining the local and global problems important for deep understanding of the multifaceted demands in sustainable design.

The Visualization of Circular Economy Models

The design methods such as the visualization of life cycles and the idea of cradle to cradle, enabled understanding and analyzing conceptual systems of circular economy and sustainable design (Picture 2). During the second course (Design Concepts for Circular economy) the companies involved, found visualizations very helpful for their further development of sustainability in their production.

Proactive design is essential to extend the life circle of products. This means designing with purpose, to think about emotional attachment to products, to take the symbolic values, high quality and functionality of the products in to consideration. These are not just material or technical aspects, but deeply design aspects based on empathy and humanistic understanding.

As an outcome, the students developed life cycles on different levels. They presented solutions from the point of view of material use or purpose and symbolic values of products. Sharing economy which is enabled by platforms for leasing or sharing instead of owning, came up in some concepts. Some of the teams took into consideration pedagogical aspects and attitudes such as teaching children the values of natural environment. Other teams concentrated more on business models to improve sustainable closed-loops for resources.

Feedback from Students, Teachers and Companies

For the further development of the courses, feedback was gathered from students, teachers and companies. The direct informal feedback was available through observation and discussions with students in the contact days since the classes were small, a maximum of 20 students per campus. After each course questionnaires including structured and open questions were gathered for obtaining more formal feedback from students.

In general, the content of the first course Design for Circular Economy was found relevant and the quality of information to be on a high level. The opinions of the students from different campuses did not vary remarkably. The focus of the main criticism was that the online sessions between campuses lasted too long time. In the group feedback, the students expressed their opinions on the Double Diamond design model. It was found useful but there should have been more time to concentrate on implementing the model. Students think that they learned about general knowledge on the design for circular economy and life cycle visualization, but they would also have liked to learn more about specific topics such as plastics and textile materials in circular economy.

After the second course, Design Concepts for Circular Economy the feedback was gathered by using structured questions. The students found learning in the real-life projects with companies very motivating, inspiring and interesting. Most of the groups thought that the given design briefs were clear, companies were engaged with the project and it was easy to communicate with the companies. In this course more attention was paid to use of the Zoom online learning environment due to the feedback in the first course and the online communication worked well. The Double Diamond design phases were regarded as useful and fitted well into the projects.

Feedback from the teachers was gathered in discussions and in written format. All the teachers agreed that the co-creation process for planning the course during the spring was fluent and effective. Both face-to face communication in the meetings and online communication via Skype or Zoom was successful and supported effectively the planning and development of the courses. The teachers were able to make changes based on the feedback of the first course, but some further development is needed. The teachers should support more the fluent flow of the processes in the courses by tutoring students' teamwork skills and give more support to the group dynamics.

The companies were asked utilizing an open question on their expectations and experience of the project. All the companies were satisfied with the results especially due to fresh ideas developed during the process.

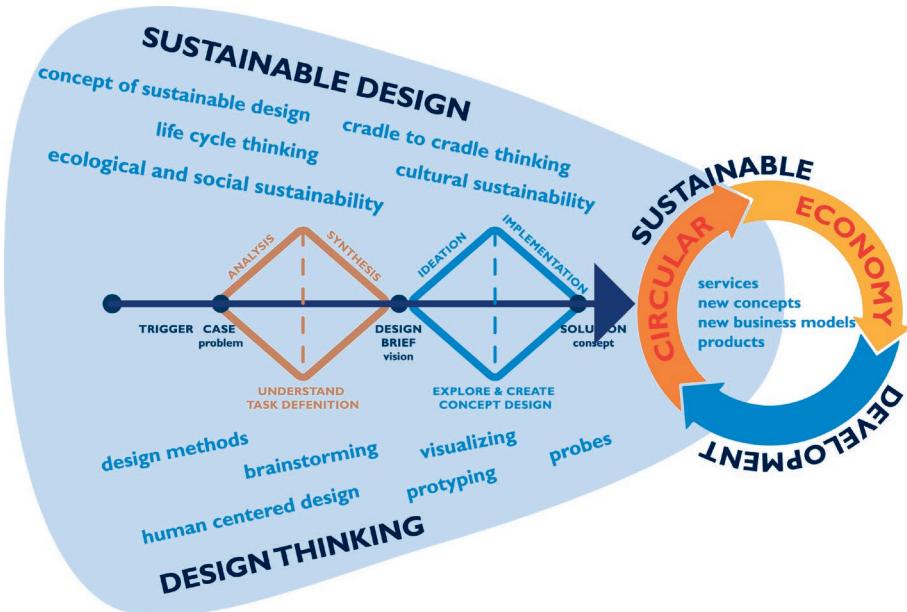
The good atmosphere and easy-going working environment were mentioned as the important success factors in this kind of the project course in both students' and teachers' feedback. For the non-design students many of the design and visualization methods were new and helpful.

Conclusion - The Future

The circular economy is becoming a more and more important approach for the governments, companies and organizations. Accordingly, the educational organizations should deepen their teaching practices towards the circular economy.

In this pilot project, the main challenge for teaching was how to cope with the geographic distance between universities and at the same time maintain the ability to communicate on design tasks during the processes. Combining sustainable design methods with design thinking, the Double Diamond structure worked well and will be used in the upcoming courses. Even though there has been some criticism towards the Double Diamond model as overly simplified and streamlined in solving the complex challenges (Marttila 2018, 25). The Double Diamond model worked well as a basis for the MUKI project. (Picture 5).

Pedagogically it was found out that not only the circular economy content and pedagogical methods are important. In addition, the way of executing the learning strategies in the network of different stakeholders is crucial. It was important to combine expertise of the universities, consider the co-design process, schedule and utilize different learning environments. The goal was a unified education, in which teaching would take place simultaneously on the three campuses.



Picture 5. Visualization of MUKI project's education process.

The student feedback was the most important thing to evaluate and improve the courses. In general, the students were satisfied with the teaching, but more attention should be paid to support the students' team building process. To develop further circular economy courses in the future, distant learning can make them more accessible for all students even globally. On the other hand, working with the companies and organizations and their sustainability challenges face to face with meetings and teams working together in the same space is also crucial. It is also important to get material samples and see the production process on-site for solving the problems concerning materials and their use.

All three partner universities of applied sciences agreed to continue the collaboration in organizing courses on design in circular economy in the following summer semester with an even more compact curriculum.

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8. The Future of Design Teaching IV

Academic Papers

Design to Care: Education Experiences to design local healthcare services

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Abstract

This paper shares the educational experience at a Product Design Studio of the International Master of Science in Product Design at Sapienza University of Rome. The course was organized as research work in the field of Design for Healthcare applied to education, using the Design Studio as a case-study. In particular, the research has evidenced the potential of design to bring improvements to the sector thanks to its creative and divergent thinking. Thus, the aim of the course was to transmit to the students the skills useful for achieving a Service and Social Innovation in the field of Healthcare. Specifically, the students were asked to develop a Design Proposal of a product/service that would provide a new User Experience for the local healthcare services (a Pediatric Emergency Room) by taking into consideration its social, economic and technological long-term sustainability. In order to reach that goal, the didactic activities were organized as a three-step process: 'to Research', 'to Design', and 'to Develop'. Each step had its own tools and deliverables, such as the Conceptual Maps, the User Experience tools, the Systemic Innovation Diagram, and the Business Model Canvas, and the Technique that was applied for the first time at this course as a design method. These tools and techniques supported students in learning, thinking, analyzing, understanding, and evaluating their works. The course finalized at a set of Design Proposals demonstrating the improvement of the Healthcare services and the possible new behaviors of its users.

Author keywords

Design for Healthcare; Service Innovation; Social Innovation; User Experience; Design Teaching Methods

Introduction

The specific theme of Healthcare arises from the consideration that the sector has been evolved over time due to many socio-cultural changes, such as the population becoming more and more old, the rising of the healthcare costs, the increase in the complexity of health technologies, the active role of patients in the healthcare process, healthcare system was increasingly stressed resulting in decentralization of care from the hospitals to the patient' houses. To address these challenges, the Healthcare system has been recently accelerating in terms of Design both methodologically and technologically, changing its habits, structures and the way users and designers look at medical products (Chamberlain 2015). Designers need to look at a holistic approach to tackle the design problem as a whole considering different conflicting requirements: the age, mental and physical conditions of the patients, the high tech of the medical products in comparison to the family atmosphere of the homes. Tackling the design problem with a set of straight conditions and a focused design strategy may open an opportunity of clearing the way for a better end-product both functional and pleasant (Foqué&Lamméneur 1995). The field of medicine has typically taken a very quantitative approach to healthcare, focusing on the immediate needs of treatment versus experience. The medical devices and technologies used to provide the most accurate and up to date diagnostics and treatments often unintentionally relegate the care and experience of the patient as non-essential consideration. However, in recent years, going beyond the functional aspect and according to a perspective in which patients increasingly stay at the center of the project, the Design Discipline turned to more intrinsic aspects with the aim to activate innovative processes in which needs of people, new technologies and products/services/environments can generate effective 'health experience'. Innovation in Healthcare is seen as the introduction of new concepts, processes, products etc., that bring an improvement to the current treatment, prevention, research improving quality, safety, efficiency, costs in a long term (Omachonu&Einspruch 2010). Aesthetic aspects require a new approach that would incorporate not only the functionality of products but also the dynamics of behavior (Ross&Wensveen 2010).

In the light of these considerations (fig. 1) this paper shares the educational experience held at design-studio lessons within the International Master of Science in Product Design at Sapienza University of Rome, the classic and new approaches and techniques applied, the results of the didactic activities as well as some difficulties encountered during the learning process by the students.

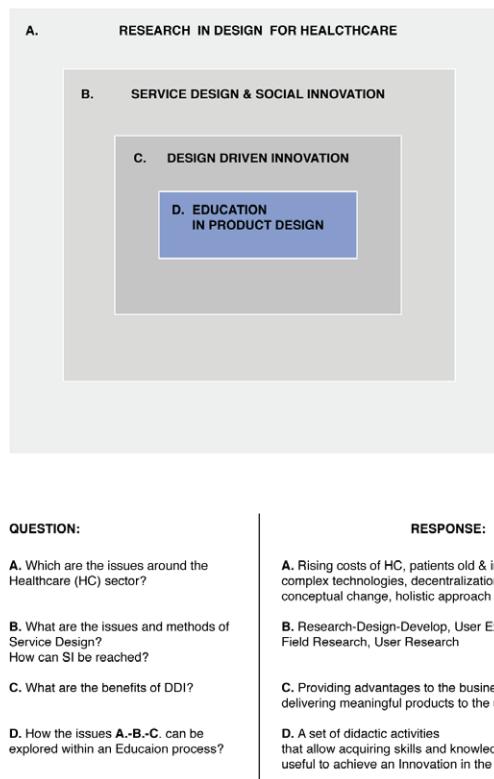


Figure 1. The scheme of thee research in the field of Healthcare applied to the educational process

Starting with the general introduction to the course and its didactic aims, it then introduces the design problems faced by the students, and proceeds with the methods of Service Design (Stickdorn et al. 2011) chosen in order to respond to the problem and to acquire necessary skills. In particular, the course invited students to design the User Experience (Norman 2004) local Healthcare scenario, analyzing the sector by visiting a Pediatric Emergency Room in the local Hospital 'Policlinico Umberto I'. Choosing the Emergency Room as a case study provided an opportunity for the students to face the real societal, economic, and technological challenges, and for the educators to transfer a range of skills useful for the designers nowadays such as multidisciplinary approach and research skills, critical analysis of the current social, economic, cultural and technological contexts, empathy to the user, and the UX design tools, the Business Model Canvas (Osterwalder 2011) as well as some other techniques like the 'Stop Motion' that supported students in developing their design proposal. The design proposal had to respond to the local Healthcare scenario by creating a Service and Social Innovation (Manzini 2015) through designing products/services that would bring improvement to the current User Experience. Therefore, the process included the Desk Research on the themes of Service Innovation, Social Innovation and

Healthcare Design, the User Research (Field), the data analysis and the ideation process finalized with a Design proposal of a New User Experience which then was evaluated from the point of view of economic and technological sustainability and was identified its level of innovation. The paper concludes by sharing the results both from the didactic and practical points of view by mentioning the results of the didactic activities in terms of projects and feedback received from the students regarding the educational process. The educational process was also supported by the Paediatric Emergencies Unit of Policlinico Umberto I Hospital, particularly, by Prof. Fabio Midulla of Pediatric Emergencies and Intensive Care Unit-Department of Pediatrics, Sapienza University of Rome, who has welcomed the students during the field research, and, by Prof. Corrado Moretti, Emeritus Chief of Pediatrics of Policlinico Umberto I, University of Rome, who has visited and provided the evaluations to the Final Works.

The course: Design to Care

The International Master of Science in Product Design includes students with different cultural and academic backgrounds and thus represents a pool for interdisciplinary interaction. The course was organized as a team-based studio focused on the investigation of the contemporary changes in the structure of markets, as well as, of the emerging forms of production-distribution which require different design approaches and more sustainable design activities.

In the last few years, there has been increasing interest in the potential of design methodologies and approaches to improve Healthcare thanks to the ability of Design discipline to draw on a tradition of creative and divergent thinking able to face the fundamental socio-cultural challenges (Chamberlain, 2015). The didactic aim of the Course was to provide specific knowledge in the areas of Service and Social Innovation (Manzini 2015) specifically in the context of Healthcare by developing new models, products and services in order to improve human wellbeing and activate sustainable innovation considering, at the same time, the environmental context, the productive possibilities, the economic system and the social aspects. The skills and knowledge required are transversal and heterogeneous and are finding their point of synthesis in the field of Service and Social Innovation in the context of Healthcare. The purpose was to transfer to the students the critical-analytical and synthetic-design tools in order to investigate the broad topic of Design-Driven Innovation (Verganti 2009) and to develop a product/service proposal considering the degree of sustainability in the long term as a determining factor.

In view of these considerations, the Design Work was aimed at developing a new product/service in the specific context of Pediatric Emergency that usually takes place in hospital emergency rooms and involves the children care (0-14 years) with different degrees of illnesses or injuries that require immediate medical attention and/or intervention. Therefore, each team had to develop a product/service which would take into account users' experiences in an emergency context and considering behaviors, needs and actions of all the actors involved in the context (children, parents, medical staff, hospital

management, etc.) before, during and after entry to the Emergency Room (ER).

In order to involve the students in an effective design process, they were asked to pay attention to the following aspects:

- from the social point of view, the phenomenon of patient-centered-care and the methods of user/human-centered-design (Brown 2011);
- from the economic point of view, the issue of economic sustainability, that is use, safeguard and sustain resources (human and material) to create long-term sustainable values;
- from the technological point of view, the phenomenon of new Information and Communication Technologies (ICT).

Design to Care: Teaching Methods

The didactic phases and the related technical/experimental contributions were aimed at the acquisition of specific skills related to:

- Research Skills: the students had to acquire an interdisciplinary approach for the analysis of healthcare scenario; to develop methods for research and observe the technological production as well as the socioeconomic aspects.
- Inquiry Capability: the students had to understand the connection between technology, innovation, and design analyzing potentials and limits of existing processes; to develop a hypothesis of sustainable innovation able to cause reflections on existing values, morals, and practices specifically in the field of Healthcare;
- Design Skills: the students had to develop a design proposal through the correct organization of the productive and economic aspects; to build a consumption scenario around the cultural and social behaviors; to develop and apply a correct and suitable technological solution to solve specific design aspects.

To Research

The first step of the didactic process, the Research, was focused on the analysis of Service and Social Innovation (Manzini 2015) scenario in the context of Healthcare. Each team had to search and analyze products, projects, processes, scientific research, design proposals that could be considered 'good practices' in terms of Design in the field of Healthcare and Pediatric Emergency. The examples include those of the Human/User-Centered-Design approach (3), User Experience tools (4), Environmental, Economic and Social Sustainability concepts (Brundtland 1987), Smart Technologies and Smart Ambient (Aarts&Encarnaçao 2006), etc. The selected projects had to demonstrate the improvement of a certain people's behavior or the solution for an economic, social or environmental problem. The deliverable of this step was a conceptual map (img. 2) where these experiences were put

in relation in a way to find inputs and evaluate potentials and restrictions of the phenomenon of the 'Service and Social Innovation' in the context of Healthcare. In order to create these maps, to represent visually the information and to communicate the findings, students had to explore the Infographics (4) as a tool. Difficulties were met by those students who didn't have a design background. These situations required additional attention from educators.

In between the steps of the learning process, a series of lectures were organized in order to introduce necessary concepts and approaches, such as lectures on Service and Social Innovation, Design-Driven Innovation and Innovation in Healthcare, a lesson on the User Experience tools, as well as a thesis work presentation of a newly graduate who had worked on a product for Emergency Room. Having lectures is not only a traditional way of transmitting information, but also a way of verification of the vision is shared in the same way by everyone as it allows a direct dialogue. It is both difficult and important in an international and multidisciplinary environment because many of the concepts are often either not known or are known in different manners.

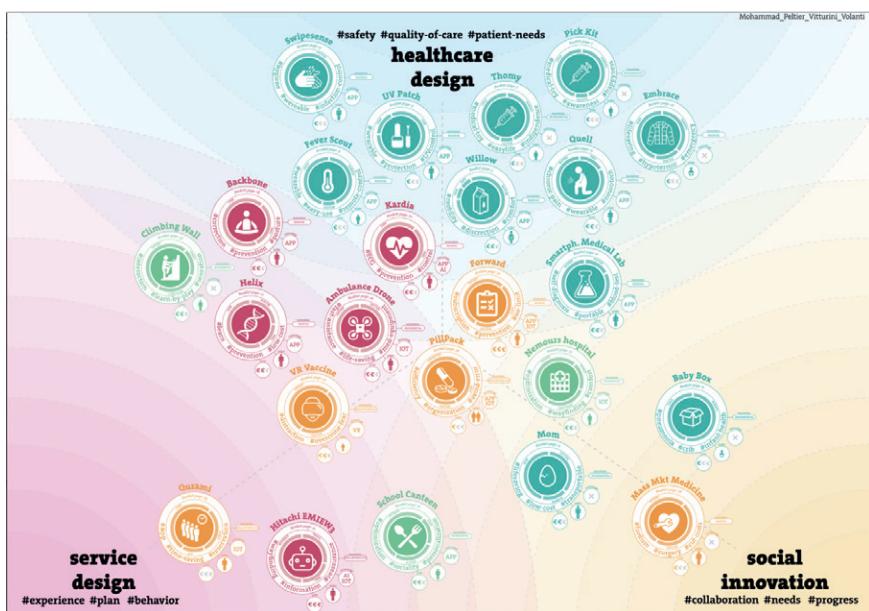


Figure 2. 'Research' step's delivery: Concept Map of Service, Social and Healthcare Design Innovation (NURSE Team: Mohammad S., Peltier T., Vitturini L., Volanti V.).

To Design

Starting from the results of the previous, the next part of the educational process, the Design process, was focused on the understanding of what

happens before, during and after the entry to the Emergency Room (ER) in terms of products, people and environment. The process was divided into 3 steps: the User Research (5), analysis and ideation, designing a proposal.

The User Research was set up as a 3-steps work: planning the user research, collecting empirical data, and data analysis. The planning supposed setting the design objectives and identifying the target audience; the collection of empirical data was realized through the interviews, observations and surveys; the data analysis was performed using some User Experience (UX) Design tools that will be explained later (3, 4).

The first step was prepared in-class, including the research logistics: the activities to do with the participants, the time, the location, the tools. The data collection has started with the immersion into the local context as a series of visits to the Emergency Room. The visits were officially arranged and the Hospital provided access for the students for them to perform the research activities. The observation was accomplished through shadowing the daily activities, taking field notes, making sketches. The surveys involved a personal network of the students as well as open resources like Facebook and Google



Figure 3. The surveys' results (CEWEK team: Ayala Ramirez M.J., Natasha E., Talone G., Telesca E.).

surveys. The surveys' results were systemized later in a table demonstrating visually the percentages and the ratio of the collected data through pie charts (img. 3). The interviews allowed going into the core of the experience though they were more useful for the students who could talk fluently in Italian, as

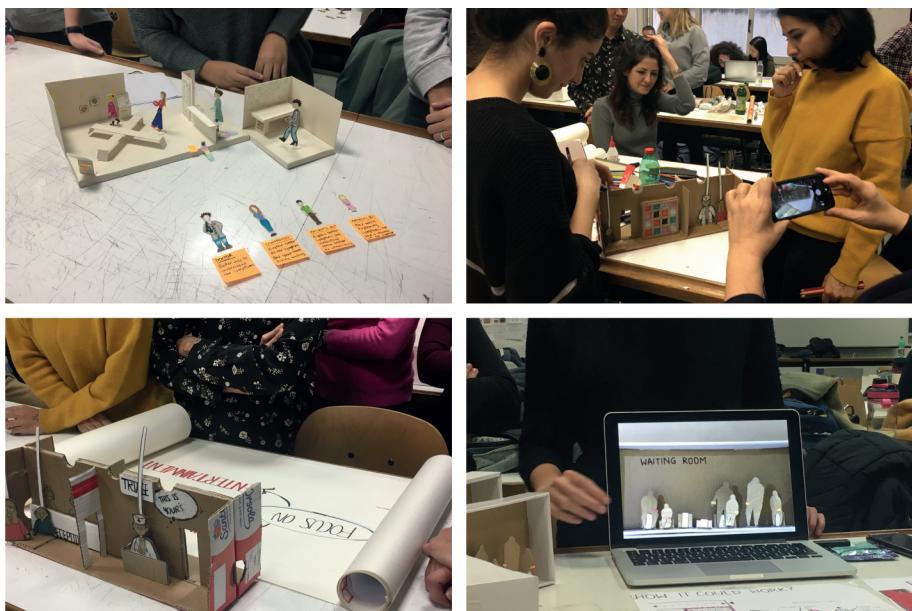


Figure 4. Students presenting the new User Experience through Stop Motion technique: telling a story with the cardboard mockups of the Emergency Room and its users' characters.

perceiving spontaneous expressions and emotions requires good communicative skills. However, these studies have been insightful both for the local and the foreign students, as they could discuss the distinctions in the Healthcare systems as well as in the idea of providing care in different countries and cultures. The final step of the data analysis was performed by using the UX tools like Personas (Lidwell et al. 2010)(3, 4), Empathy Map (Gray 2010) (3, 4) and Customer Journey Map (Brown 2011)(3, 4). The analysis was finalized in describing the archetypes, their social and demographic characteristics, needs, habits, motivations, taking in consideration their emotional, behavioral, and rational dimensions in respect to the current User Experience, in identifying steps of interaction with the current products/services and the touchpoints.

The second step of the Design process was organized as a 3-days Workshop, where students were given time with the aim to focus on their findings, analyze them and eventually come up with a proposal of a product/service that would create a new User Experience for the Emergency Room. The three days didactic activities were structured as the following steps: 'Before-Idea-After', and each day was dedicated to one step. The step 'Before' was dedicated to analyzing the Personas and their current Customer Journeys with an objective to extract the 'User Needs' of each Persona and to select which of these to design a proposal for. During the process, it was noticed that the students met difficulties in making the difference between what means a 'problem' and the 'User Needs'. For example, many of them have stopped with

an idea of the time-related issues in the Emergency Room, because the waiting time there was indeed long. However, this understanding has led to difficulties in the following 'ideation' step.

The next day of the Workshop the students were asked to enter into the ideation process and to propose their idea according to the User Needs extracted at the previous step. The proposal had to be presented describing its three main aspects: functionality, usability, morphology. The proposal could be an improvement of the existing product or an alternative solution, or a completely new system and service. As it was mentioned above, the confusion in understanding the 'problem' and the 'user needs' has led to restrictions in the ideation process, as for many students seemed that there was only one problem that had only one solution. Shifting their attention back to the User Needs has opened a range of new design opportunities, as in the Emergency Room there are several Personas, each of them having different needs even related to the same problem of timing. For instance, doctors, nurses, patients that are different in their age and their physical condition, and the people who accompany them, all of them had their needs different one from another while the same time was passing for them.

The third and the last day of the Workshop was dedicated to designing a Storyboard (4) using a 'Stop Motion' technique (6) in order to explain and test the new Experience the students want to propose for the ER. The 'Stop Motion' technique is generally applied to animated film-making, where the animation is composed of separate frames in which objects are fixed in small increments and when played back the sequence seems to be a smooth motion. The goal was to describe the 'User Need' that was solved by the product/service proposed highlighting the changes between the previous context and pointing out the new user behavior. The advantage of the 'Stop Motion' technique lays in the way it is performed. The students not only had to imagine the interaction between the user and their proposal but to actually build it and test it step by step, 'frame by frame'. The process of projects' evaluation through re-creating (learning through making) the interaction process between the final user and the proposal step by step has simplified the empathy to the user, and has evidenced immediately the problems of the interaction process, making it visible when some component was either missing or extra (img. 4). As the picture shows, the students were provided with the floor plan of the Emergency Room, so they had to build a model of that, to cut out the 'puppets' of their users and of their proposal. Then they had to make a series of pictures, each of them stating a moment of the interaction, of the users' behavior. Then this series of pictures was set together as a short video explaining the new Experience in the ER according to the 'User Needs' selected at the previous steps.

To Develop

The 3rd and the last step of the didactic activities was dedicated to developing the Social Innovation in the field of Health Care based on the approach of

Service Design (Stickdorn et al. 2011). According to Service Design approach, the step 'Develop' aims at evaluating the level of innovation and the validity of the proposal regarding the social request. The design tools used for this step were two: the Benchmarking (Boxwell 1994) and the Business Model Canvas (Osterwalder 2011). The final result of the Benchmarking was to evaluate the level of Innovation of the proposal. In order to do that, the diagram of the Systemic Innovation (7) was used, where the students could place their findings in relation to the two axes: the creation of new markets and the change of the use (img. 5).

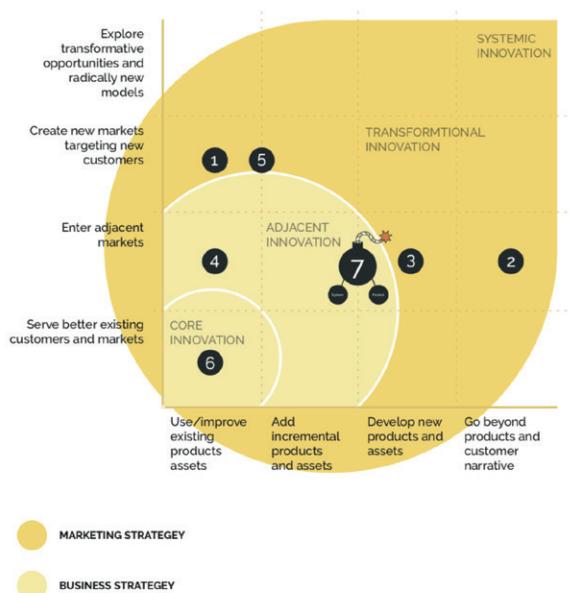


Figure 5. The diagram of the Systemic Innovation and the Benchmarking Analysis (BOMB team: Allotta D., Asur P., Kumar S.R., Othman H.).

Business Model Canvas (img.6) describes and evaluates the supply-chain behind the design proposal, defining in detail:

- 1) what is the real value for the users;
- 2) the identification of the target audience of the value proposed;
- 3) the stakeholders useful to realize the design proposal;
- 4) the economic impact of the business (in terms of quality).

During the process, several problems in learning and comprehending have been noticed. Regarding the Systemic Innovation diagram, the students met difficulties in evaluating correctly the level of innovation, as for many of them it seemed that the higher is the position of the project in the diagram, the 'better' the design is. The achievement was to reach an understanding that the

Benchmarking and the diagram serve to correctly place the product in the market, rather than to force the project to the diagram's borders. Regarding the Business Model Canvas, the problems were related to identifying the owner of the business in the project, which has thus led to confusion in finding the stakeholders, the key resources and activities. The collective misunderstanding has brought to an idea that some issues require deeper explanation.

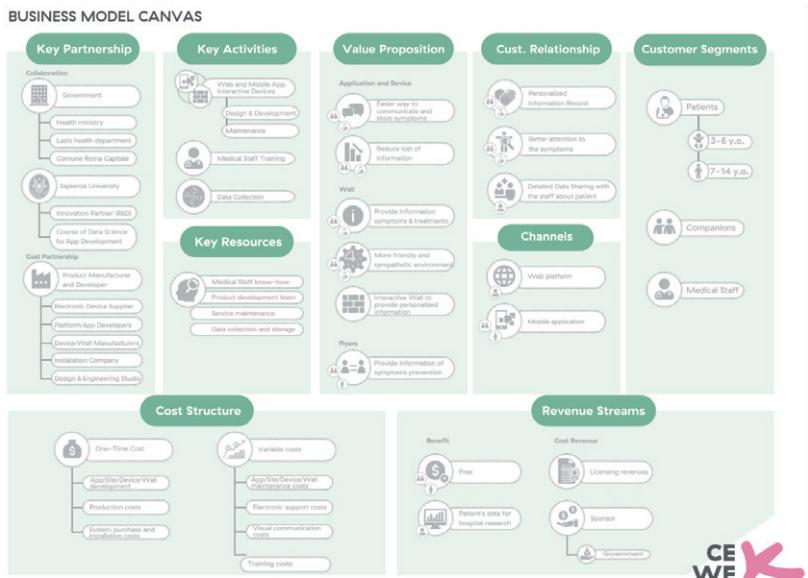


Figure 6. Business Model Canvas (IC team: Belluzzi C., Duello P., Chakka S., Li S., Hamzeh langroodi N.).

Conclusion

The didactic activities have been concluded with a series of projects responding to the User Needs at the Pediatric Emergency Room proposing a New User Experience. The proposals have taken into consideration the analysis of the state-of-the-art in Service and Social Innovation and Design for Healthcare, the students have conducted the User Research, have evaluated the level of Innovation, the technological feasibility and economic sustainability of their proposals. After, for the Final Works, the students have developed the mock-ups of their design proposals that would demonstrate the morphology and the usability of the product/service they designed. They also have prepared a model of the Emergency Room in order to visualize the Proposal in the environment as well as the people involved in the New Experience. The

booklets were prepared in order to report all the three steps of the didactic activities: 'to Research', 'to Design' and 'to Develop'. The videos and the brochures were done in order to prepare the projects for the possible promotion, including the crowdfunding campaigns (img 7., 8).

Practically, the proposals mainly responded to the children's experience providing objects and services that would distract them from the negative experience, thus contributing to their better emotional and psychological condition during the time spent in the ER through a new behavior proposed. Some proposals though included also other organizations and institutions in their scenario, for example by including the schools or psychological research units.



 DESIGN
to CARE

Product Design Studio 4

Prof. Loredana Di Lucchio, Angela Giambattista

Figure 7. The Final Works: Design Proposal mock-ups showing the morphology, functionality and usability of the proposal (IC Team: Belluzzi C., Duello P., Chakka S., Li S., Hamzeh langroodi N.).

Next, there are the 2 examples of the students' Final works that we consider the most complete from the design point of view since they have not only responded to the problems but also included other considerations, institutions, and disciplines in their projects:

1.NURSE Team: Mohammad S., Peltier T., Vitturini L., Volanti V. «ER campaign» (img. 9). The project aims at reassuring the young patients throughout the Emergency Room experience, and increase their awareness of issues relevant to their health and safety. It involves an awareness campaign that goes



Product Design Studio 4

Prof. Loredana Di Lucchio | Angela Giambattista
Teaching Assistant: Masha Zolotova, Maria Grazia Di Vito

Figure 8. The Final Works: Design Proposal mock-ups showing the morphology, functionality and usability of the proposal (NURSE Team: Mohammad S., Peltier T., Vitturini L., Volanti V.).

outside the ER, accompanying the child at home and at school. The campaign will start in the ER, when at the triage the patient receives a closed box containing a cardboard figure, some informations and a personal QR code. Through the code the patient can download the Friends In ER app and access a personal area, create an avatar and access a virtual room where there are avatars of children who, like him, in the past have been in the emergency room and they shared their experience. This makes the patient feel less alone. When the child is called to visit he will find, in the various departments, accessories distributors, different for each problem dealt with. The child will be able to collect these accessories thanks to the special slot, in his personal box. The patient, once back home, can then open the box and have fun coloring, customizing, gluing the pieces, creating an avatar that recounts his particular experience within the emergency room. Through the app, the child can finally share his/her experience, now completed, and be an example for other children who will be in the ER in the future, so that they can feel less alone. The campaign will also continue at school, where children will find informative posters, a book containing a story for each accessory and will participate in lessons on the subject prepared by the teachers, facilitating the sharing of experiences among peers.

2. IC Team: Belluzzi C., Duello P., Chakka S., Li S., Hamzeh langroodi N.
«Emotional Room» (img. 10). Emotional Room is a project that aim to em-



Figure 9. Project «ER campaign» (NURSE Team: Mohammad S., Peltier T., Vitturini L., Volanti V.)

power existing treatments with the introduction of a therapy based on emotions relieving. The system is composed by two elements: the device and a display wall. Experiencing the device, children can get rid of bad feelings during their journey in the pediatric ER. The project, indeed, acts on three main emotions (anger, stress and anxiety), integrating into the design process colors therapy, tactile feedback studies and morphologies of childish products. The analog interaction is supported by a digital system of data collection, accessible by doctors and researchers, as well as parents. The service offered aims also at better communication and entertainment for patients, improved organization of the medical staff and full interaction among children, parents, nurses and doctors. This project can be a turning-point in the medical field: it is the first time that feelings are considered as important aspect during medical treatment. It can develop new studies based on emotions that can bring innovative therapies.

From the didactic point of view, the most difficult in comprehension part for the students was 'to Develop', since the activities and the instruments of this part (Business Model Canvas and Innovation level analysis) required the skills related typically to marketing/business activities. Some students though have appreciated the practical value of these instruments in real life, while it is commonly considered that nowadays university education stays too much far away from the job reality. This feedback then gave an idea of the possible missing bridge between the two worlds, which is the business analytic skills

Designed to Care

The system is composed mainly by two elements: the cradle and the wall. The device is composed with a central part which is the cradle, where the child can sit and receive care, and a wall part which, whenever the child is seated in the cradle, receives the same sensors collect and store data. The wall is right close to the main entrance of the room, so it is possible to have a quick access to the room where all the devices are stored so that the parent can easily interact with the child. The cradle has a central part where the child can sit and a structure, located in the middle of the waiting room, where kids can play together.

#entertainment #remotecontrolled #emozionetracking
#feelingcommunication #playfulenvironment #interactive

Empowered Experience

The service of hand during the whole experience in the gardens. GRabs the children's hands and makes them feel safe and secure. It is the main organiser of the emotions, it starts at the moment of the first contact to the child, the first touch, the first smile. The service of hand is a personal account where is possible to add informations, pose physical questions, make a game, etc. The service of hand is a way to play with the playing with it. Moreover the entire service allows to check medical records, to make a payment, to book an appointment, to make a call. The colors that characterize the elements that make up the entire service are blue, green, orange, yellow, red.

#emotionconsiderrange #gigglealarmmonitoring
#funandcancer-fighting #Futureexperience #Kiddiefriendlyenvironment
#kiddiefriendlyservices

New Treatment Scenarios

This project can be a turning point for the medical field, due the new treatment scenarios that are being developed. The new treatment scenarios are based on the fact that can bring treatments to a new level, direct, useful, help to achieve personalized treatments and new experiences. The Emotional Room project is a new scenario that can bring a new level of treatment, a new way to act, a new way to achieve relief. So, the idea is to be open to other possibilities, to other ways of thinking about the disease. From different studies and researches through concrete data.

#treatmentquality #innovationinmedicine

Emotional Therapy**Usability****Anger Relief**

Motion, Interactive Button, Technology, Photo Sensor, Action: Joy, Color: Orange

Color Therapy Blue

Dark blue represents the user awareness. Wearing this color produces a sense of relief and tension in the nervous system. The tension decreases, the heart rate and respiration are regularized, the body relaxes, recovers.

Stress Relief

Motion, Interactive Button, Technology, Photo Sensor, Action: Peace, Color: Green

Color Therapy Green

Green represents balance, balance, balance and hope. Known as the act at the root of the nervous system, calming, regresses and stimulates the body, helping to restore balance and harmony and calm.

Anxiety Relief

Motion, Interactive Button, Touch Function, Technology, Touch Sensor, Action: Joy, Color: Orange

Color Therapy Orange

The result of the mixture of vision and mediates the case of serenity without exciting the mind or forcing an electric action like yellow. Orange is the color of the sun, the light, the energy, it is therefore perfect for activating breathing or circulatory.

Product & Displacement

The device is designed considering the average of the hands' measures of children. In this way it is ensured an ergonomic handle of the components. The arms are connected to the assembly structure by magnetic joint.

**Create Your Playful Space**

To design a more playful and joyful space, it is possible to use a different configuration of the wall. For example, a system of shapes that make the wall more dynamic. In this way, the choice of structures arranged around the space creates a more playful atmosphere.

As a result of the research, shapes can change to improve the efficiency of the emotional therapy.



Figure 10. «Emotional Room» (IC Team: Belluzzi C., Duello P., Chakka S., Li S., Hamzeh langroodi N.)

that allow bringing the ideas down to the earth and make them feasible and credible for the potential investors. The Workshop instead, with its spirit of a design studio and collective work, helped many of the students to focus and come up with ideas in a short time. In particular, the Stop Motion technique has contributed to fast analysis and verification of the Design Proposal by providing simple, hands-on tools for re-creating and 'experiencing' the User Experience around the new products and services. Later, some students have encountered difficulties in maintaining coherence in between their original idea and the final results, as while analyzing the ideas they were encountering some negative considerations which pushed some of them to deny their ideas and change them. For the final examination, an expert from the medical field has been invited to give a non-design point of view and to assess if the projects have a correct and comprehensible communication language, since the next step would be to present the projects to the Pediatric Emergency Room the students have been designing for in order to get a possibility to realize the project. Having said all this, we can conclude that the overall experience has demonstrated the validity of the teaching method, as the three parts: to Research, to Design, and to Develop, have allowed the students to structure their activities that resulted in innovative ideas of Services and in coherent storytelling of the projects. The Research part has brought them to an understanding of the importance of the emotional component of the User Experience, 'to Design' part has demonstrated the practical value of the UX tools, and 'to Develop' part provided some useful evaluation tools that allow the analysis of the project from technological (mock-up) and economic (Business Canvas) point of view. In particular, Prof. Corrado Moretti, Emeritus Chief of Pediatrics of Policlinico Umberto I, University of Rome, during his visit at the Final Works, has pointed out the actual value of the design proposals, and, thus, the work on the project continues with the aim to promote these

prototypes to the Policlinico Umberto I hospital for further possible development.

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Notes

- (1) The Introduction, 'The course', and 'Conclusions' are written by Giambattista A.
- (2) 'The course: Teaching Methods' are written by Zolotova M.
- (3) Tools for Design Thinking process: «What is Human Centered Design» www.designkit.org/human-centered-design Last access 01.02.2019
- (4) Tools for Designing Services: «Service Design Tools» servicedesigntools.org Last access 15.02.2019
- (5) User Research Basics. usability.gov/what-and-why/user-research.html Last access 12.02.2019
- (6) An example of slow motion film: «First animated film». Guinness World Records. Last access 5 January 2019.
- (7) Systemic Innovation Diagram: Hollins, P. (2017). RAGE Potential Business Models. RAGE EU 2020 Deliverable.

A preliminary review of the concept of circular economy in design research

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Abstract

Themes such as economy of materials, environmental degradation or optimization of production and consumption flows have long been discussed in design and design research. Lately, the concept of circular economy entered the stage as “an industrial economy that is restorative or regenerative by intention and design” (Ellen MacArthur Foundation, 2013). One of the reasons behind the current fascination toward circular economy is surely the (implicit or explicit) promise that circular economy yields the potential to foster environmental protection without limiting economic growth. As such, circular economy has been seen as a way to develop more sustainable business models and entrepreneurial processes but has also been criticized for its neoliberal foundation. Within design research, a good number of contributions looked into theoretical aspects or practical applications of circular economy. The aim of this paper is to survey the field by reviewing some 75 contributions ranging from books and book chapters, journal articles and conference papers. The paper presents a variety of views that not only show different ways in which design research approached circular economy, but also hint at possibilities for further investigation.

Author keywords

Circular economy, design research, literature review

Aims

Themes such as economy of materials, environmental degradation or optimization of production and consumption flows have long been discussed in design and design research from perspectives as diverse as the British Arts and Crafts movement or functionalism and modernism (Fuad-Luke, 2004). Across the 1960s and the 1970s, Richard Buckminster Fuller and Victor Papanek advocated for more sustainable design approaches and invited designers in using their skills to address socially useful ends rather than being solely oriented toward commercial interests (Fuller, 1969; Papanek, 1972). Landmark reports such as the Club of Rome's *Limits to Growth* (Meadows, Meadows, Randers, & Behrens III, 1972), the work of the Brundtland Commission (Brundtland Commission / World Commission on Environment and Development, 1987) or the documents released by the Intergovernmental Panel on Climate Change (formed in 1988) prompted reactions from parts of the design community, which responded proposing approaches such as green design¹, ecodesign², design for sustainability³ and, more recently, transition design⁴. Although some studies tried to map the evolution in the use of these terms (Ceschin & Gaziulusoy, 2016), the distinctions and the boundaries between these approaches can still be a bit blurred.

Lately, the concept of circular economy entered the stage as "an industrial economy that is restorative or regenerative by intention and design" (Ellen MacArthur Foundation, 2013). One of the reasons behind the current fascination toward circular economy is surely the (implicit or explicit) promise that circular economy yields the potential to foster environmental protection without limiting economic growth (Lieder & Rashid, 2016). As such, circular economy has been seen as a way to develop more sustainable business models and entrepreneurial processes (Balkenende et al., 2018).

Within design research, a good number of contributions looked into theoretical aspects or the practical applications of circular economy. Systematic efforts to

¹ A term used "in the building, furnishings, and product industries to indicate design sensitive to environmentally-friendly, ecological issues" (Stephens & Stephens, 2009, p. 376). Green design can be characterized as "the act of mitigating environmentally destructive and excessively consumptive processes and practices associated with the creation, use and disposal of products or projects" (Flemming, 2013, p. 57).

² Ecodesign has to do with "integrating ecological awareness into design practices" (Brower, Mallory, & Ohlman, 2009, p. 7).

³ A design approach that "considers environmental (for example resource use, end of life impact) and social impact of a product (for example usability, responsible use)" (Bhamra & Lofthouse, 2007, p. 39)

⁴ As put by Tonkinwise, transition design is inspired by the Transition Town movement and "is an attempt to name an ambition for an expert craft of designing that acknowledges the extent of our social crises by advancing the practices of social and sustainable designing through the incorporation of multi-stage practice-oriented transformation" (Tonkinwise, 2015, p. 91).

map scholarly contributions related to various aspects of circular economy already exist (e.g., Prieto-Sandoval, Jaca, & Ormazabal, 2018; Korhonen, Nuur, et al., 2018). However, only a few of these review papers more specifically looked at the role of design. Tukker, for instance, focused on the evolution of the concept of product-service system in the perspective of circular economy (Tukker, 2015). Ceschin and Gaziulusoy (2016) reviewed different approaches in design for sustainability using a framework based on different logical levels (from product innovation to systemic transformation) and following an almost chronological order (from green design to system innovation and transition). Lofthouse and Prendeville analyzed the positioning of human-centred design within circular economy by bringing together insights from various fields including economics, sociology, management and ecology and thus not limiting their review to the design field (Lofthouse & Prendeville, 2018). This article intends to complement these mapping efforts by (1) more specifically looking into the design research field and (2) narrowing the scope of the analysis and only reviewing those contributions that specifically focus on circular economy (rather than other design for sustainability approaches).

Methods

The review started with an analysis of how the construct of circular economy is used in articles published in key design journals. The selection of journals originated from an article that, in 2012, identified 40 design journals deemed as particularly relevant for design research (Gemser et al., 2012). Two new journals have been added to this list: *She Ji* and *Design Science*. Searches for the term “circular economy” (in all the text of the articles) were performed for each of these journals. Additional searches through ISI Web of Science database and Google Scholar using the words “circular economy in design” have also been carried out. From this process, 90 articles emerged. Adopting a ‘snowball’ approach previously used in literature (Ravasi and Stigliani, 2012; Hernández et al., 2018), these contributions have been analyzed to check whether the works they cited could be of interest, for example, because they were consistently cited or highly relevant to our research question. During the snowballing process, 17 additional publications were selected. Titles and abstracts of all these contributions were examined as to distill the most relevant publications, i.e., the ones that more closely focus on circular economy frameworks, concepts, circular design strategies or present cases, rather than just mentioning circular economy in the background of their argumentation. This left us with 75 articles, conference papers and book chapters.

These publications were then more closely analyzed according to a protocol in which bibliographic data and a brief description of the content were gathered and then independently examined by each of the authors of this review. All the publications were then grouped according to five clusters emerged by integrating the independent categorization processes carried out by the researchers: (1) design education and circular economy, (2) design and circular production processes, (3) the potential of design to intervene on the demand side, (4) the use of design to support policy and regulations oriented towards circular economy and (5) other reflections on design theories and frameworks for circular economy. The term ‘cluster’ is used - rather than category - as to suggest that boundaries across the clusters were quite flexible.

By no means, this paper aims at offering an exhaustive mapping. Rather, the paper presents a variety of views that not only show different ways in which

design research approached circular economy, but also hint at possibilities for further investigation. At this stage, this survey is marked as preliminary and the authors hope that the current version of the paper can gather the attention of other researchers working on this topic and interested in further jointly developing this literature review.

An introductory characterization of circular economy

The idea that the material cycles tied to production and consumption processes need to be optimized has been around since the first stages of industrialization (Desrochers, 2002; Fuad-Luke, 2004). Already starting from the 1960s, ecological and environmental economists argued that economy should be conceived as a circular system (Boulding, 1966; Pearce & Turner, 1989). While focusing on industrial economics, Stahel and Reday proposed a loop economy to refer to strategies for waste prevention and reduction, dematerialization of the industrial processes and optimization in the use of resources (Stahel & Reday, 1976). Along similar lines, industrial ecology analyzed the strict interplay between the industrial system, its environment and the related flows of material, energy and information (Erkman, 1997). More recently, the concept of circular economy brought to the table an approach that more broadly emphasizes "product, component and material reuse, remanufacturing, refurbishment, repair, cascading and upgrading" (Korhonen, Nuur, Feldmann, & Birkie, 2018, p. 545). In this sense, circular economy builds on top of related approaches ranging from cradle-to-cradle design (Braungart & McDonough, 2002), up to biomimicry (Benyus, 2002), all the way up to eco-efficiency (Huppes & Ishikawa, 2009), just to name a few.

In the past 10 years, circular economy has received increasing attention also thanks to discussions led by policy makers (CIRAIIG, 2015; European Commission, 2015; Ghisellini, Cialani, & Ulgiati, 2016) and to the work of business advocacy bodies and industry, such as the Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2013, 2015), IDEO⁵, Arup (ARUP, 2016) and McKinsey (Finland's Independence Celebration Fund & McKinsey, 2014), which all published reports and toolkits that show the potential of circular economy to support a broad transition towards more sustainable business models. As both the concepts of circular economy and sustainability are gaining traction, they are, at times and uncritically, used interchangeably (Geissdoerfer, Savaget, Bocken, & Hultink, 2017)⁶.

A few authors analyzed the current high number of characterizations of the term and proposed some integrative definitions. Jouni Korhonen and colleagues saw circular economy as:

[Circular economy - CE] is a sustainable development initiative with the objective of reducing the societal production-consumption systems' linear

⁵ <https://www.circulardesignguide.com> accessed 26 November 2018

⁶ Although comparing the two terms is not the main focus of the paper, we will here briefly report the definition of sustainability provided by the cited authors: "the balanced and systemic integration of intra and intergenerational economic, social and environmental performance" (Geissdoerfer, Savaget, Bocken, & Hultink, 2017, p. 759).

material and energy throughput flows by applying materials cycles, renewable and cascade-type energy flows to the linear system. CE promotes high value material cycles alongside more traditional recycling and develops systems approaches to the cooperation of producers, consumers and other societal actors in sustainable development work (Korhonen, Nuur, et al., 2018, p. 547).

In a similar attempt, Prieto-Sandoval and colleagues elaborated the following consensus definition in which they characterized:

circular economy as an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close energy and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions and governments) levels. Attaining this circular model requires cyclical and regenerative environmental innovations in the way society legislates, produces and consumes (Prieto-Sandoval et al., 2018, p. 613).

By stating that circular economy is not the only possible answer to the question of sustainability, these authors also looked into how different sustainable design strategies - e.g., eco-design guided by life cycle assessment processes, cradle-to-cradle (Braungart & McDonough, 2002) or biomimicry approaches (Benyus, 2002) - can be applied (as "catalyzers") to design services and goods that can be reintroduced in the system and reduced, reused and recycled within circular economy.

The work of these authors is particularly important to go beyond the widespread characterizations of circular economy as simply "depicted as a combination of reduce, reuse and recycle activities, whereas it is oftentimes not highlighted that [circular economy] necessitates a systemic shift" (Kirchherr, Reike, & Hekkert, 2017, p. 221). Along the same lines, Bocken and colleagues developed a framework to provide a rich conceptual overview of the possible design and business model strategies for circular economy (Bocken, de Pauw, Bakker, & van der Grinten, 2016). The authors acknowledged the need to take stock of the inherent complexity of remodeling current business models in relation to circular economy. To help address such complexity, while considering innovation projects and actions in relation to circular economy, Prieto-Sandoval and colleagues characterized interventions on the supply side, on the demand side and on regulation and policy (or, in other terms, on production, consumption and legislation) as three areas of particular relevance (Prieto-Sandoval et al., 2018).

Summary of the articles analyzed

Design education and circular economy

Some scholars provided their considerations on how circular economy is (or could / should be) taught in design schools. In general, a good number of authors seem to converge on the need to change the current curricula of design schools as to more broadly include key circular economy approaches and

appropriate related processes for product design, co-creation, management and marketing (Leube & Walcher, 2017). To this extent, design education should more closely embrace open design and distributed production paradigms, which can support circular economy (Collina, Galluzzo, Maffei, & Monna, 2017). Virtanen and colleagues analyzed how a Circular Material Library - i.e., a library containing a selection of available recycled materials - can favors circular re-thinking and re-designing of products (Virtanen, Manskinen, & Eerola, 2017). The authors argued that in the future, such material libraries can be linked to online material shops through which students, designers and companies can directly buy and sell resources. Some other papers look into those particular skill sets oriented to collaboration, facilitation and negotiation that designers need in order to address complex challenges such as circular economy (Bianchini & Arquilla, 2019; Papalambros, 2015; Pedersen & Clausen, 2018; Vermaas, 2016). Haemmerle and colleagues argued that there is a gap between the expert knowledge needed to operate in the field of sustainability and what is taught and practiced in current design education (Haemmerle, Shekar, & Walker, 2012).

Past and current experiences of education programmes that clearly oriented their activities taking into consideration circular economy can provide insights (Yekta, Muireann, Adam, & Manon, 2018), like in the case of the Textiles Environment Design research group at University of the Arts London. Earley chronicled the last two decades of this research group and showed how circular design informed a variety of their projects at the intersection of educational, research and design / practice-oriented activities (Earley, 2017).

Design and circular production processes

Other authors looked into how design can support and streamline production and manufacturing processes as to implement circularity, reduction of waste and optimization of resources. This is an area that design researchers seem to consider of particular relevance. By far, in our review, this is the category with the highest number of contributions.

Some contributions mention the need to take into consideration the development of products, institutions, and systems appropriate to recycling, remanufacture, and re-use as one of the key themes for design innovation (Mortati, 2015) and design-driven manufacturing processes (Roos, 2016). To this end, digitally-enhanced and distributed production models - e.g., the ones behind the makers movement (D'Elia, 2018; Petruilaityte, Ceschin, Pei, & Harrison, 2017; Smith, 2017) - are examined in light of their potential to support light, locally grounded and more circular supply chains. As such, the need for the adoption of more open and collaborative production processes that also include the use of maker spaces is highlighted (Smith, Baille, & McHattie, 2017). Such analyses look at various geographic contexts (D'Elia, 2018; Fleischmann, Hielscher, & Merritt, 2016), but there seems to be a high concentration of studies focusing on the UK (Coulson & Woods, 2016; Gallagher, Coughlan, Williams, & McNabola, 2018; Johnson, Champion, McHattie, & White, 2016; Smith, 2017; Smith, Baille, & McHattie, 2017).

Some other authors more critically looked at some possible limitations of these maker-based distributed production models. Unterfrauner and Voigt studied the makers' movement in relation to their ambition to do socially valuable things -

including their environmental awareness (Unterfrauner & Voigt, 2017). The authors stated that "there is a visible risk that the innovative momentum of 'making' gets lost in response to market pressures, lacking awareness of customers and makers not yet able to capitalize on their collective powers, missing the chance of innovating their own ways of collaborating in interdisciplinary teams" (Unterfrauner & Voigt, 2017, p. S3324). Kohtala analyzed a design school's Fab Lab in a university in northern Europe and noted how those fab labs and makerspaces with "strong ecology-oriented visions and programmes [...] provide important role models, and they prove that open-design, digital-craft processes can serve sustainability-oriented priorities" (Kohtala, 2017, p. 389) but, at the same time, she argued that "maker communities are divided in their sustainability orientations and knowledge" (p.388) and that in some cases "very real, potentially far-reaching consequences of personal fabrication often seem to be invisible in Fab Labs in the global North: the reality of the supply chains outside the Labs, the reality of electronic component manufacturing and the toxic reality of e-waste" (p. 388). Fleischmann and colleagues suggested that, in order to live up to the potential of Fab Labs towards sustainable design ideas, Fab Labs should lead to the development of sustainability guidelines and replicable processes that facilitate co-creation (Fleischmann et al., 2016).

Some of the analyzed papers map and critically examine existing efforts towards circularity in the design industry. Moorhouse and Moorhouse looked at sustainable design practices in relation to zero waste fashion by briefly reviewing a series of initiatives currently implemented by large multinational companies, smaller niche brands or more experimental educational projects (Moorhouse & Moorhouse, 2017). The textile industry is also the focus of various studies (Mazzarella, Mitchell, May, & Escobar-Tello, 2018), including Valentine and colleagues' analysis of the recent transformations in relation to globalisation, sustainability and technological progress (Valentine, Ballie, Bletcher, Robertson, & Stevenson, 2017). The authors advocated that there is the need to more openly share ideas, knowledge, skills, resources and experiences and to more fully reconsider the ethical aspects of textile production. This is a position echoed by Markou and colleagues, who pointed out that openly sharing knowledge improves environmental considerations in the early design stages (Markou, Segonds, Rio, & Perry, 2017). Fashion and textile design in the UK and Scotland is also analyzed by the already cited Smith and colleagues and by Coulson and Woods (Coulson & Woods, 2016; Smith et al., 2017).

Scholarly works that look at other industry sectors are more sparse. Some chapters of the book *Designing for the Circular Economy* (Charter, 2018) study circularity in relation to the industry of electrical and electronic equipment (Hilton, 2018; McIntyre, 2018; Wiens, 2018). Gallagher and colleagues examined the innovation journey of a conservation charity (i.e., the largest landowner in the UK) while transitioning toward low-carbon energy. The paper particularly focuses on the systematic approach to the management of innovation adopted by the charity while combining open and design-driven innovation (Gallagher et al., 2018). Along the same lines, Morel and colleagues presented the case of an automotive company, in which an innovation community and its collective action to enable eco-innovation is leveraged (Morel, Unger, & Buet, 2016). The collaborative aspects of circular models are also the main area of focus of the literature review carried out by Watson and colleagues (Watson, Wilson, Smart, & Macdonald, 2018). The authors are

interested in defining the capabilities needed to engage external stakeholders in environmental innovation and they identify three levels: specific operational capabilities (e.g., scientific expertise, manufacturing, technological and marketing capabilities); first-order dynamic capabilities to manage the engagement; and second-order dynamic capabilities “to make use of contrasting ways of seeing the world to reframe problems, combine competencies in new ways, and co-create innovative solutions (value framing), and to learn from stakeholder engagement activities (systematized learning)” (Watson et al., 2018, p. 254). Mont reflected upon product durability and looked into design strategies for increasing product life span (e.g., design for reuse and upgrading, for easy maintenance and easy replacement; design for remanufacturing; design for upgrading; mass-customisation; timeless design) and into concepts for increasing value of durables (e.g., shift from consumer ownership to producer ownership; shift from supply chain to value chain actor-networks) and optimising utilisation rate of consumer durables (Mont, 2008). The construct of product biographies is particularly helpful to look at servitization and at how to qualify - within a circular economy perspective - products for exchange or service value creation (Spring & Araujo, 2017). Haug specified the notion of ‘resilient design’ by offering a fine-grained classification of both causes of product replacement and organizing means to extend the longevity of products (Haug, 2018).

A quite ample number of papers focus on the need to explore and use different materials or use waste as a core development material (Appels et al., 2019; Gujel et al., 2014; Lilley, Smalley, Bridgens, Wilson, & Balasundaram, 2016; Ordoñez & Rexfelt, 2017; Peck, Kandachar, & Tempelman, 2015; Simões, Simoes, Carvalho, Pontes, & Bernardo, 2013; Tenhunen et al., 2018). As an example, Turrini looked at the tradition of using cardboard to make objects and furnishing as a way of activating short and circular production chains (Turrini, 2017).

The potential of design to intervene on the demand side

Some other authors more closely focused on how design interventions can affect the demand side, e.g., by nudging toward more circular behaviour (reduce, reuse, recycle) (Bofylatos, 2018) or by leveraging Design for Behaviour Change⁷ as a way to promote the transition to a circular economy (Piscicelli & Ludden, 2016). O’Connor pointed out that “a widespread behavioural change is required. Citizens need to act now and influence through their purchasing decisions, while educational institutes and governments need to immediately put the right mechanisms in place to enable a truly responsible, fair and just economy to be created” (O’Connor, 2018, p. 87).

Ackermann identified some factors that might influence customer behavior as regards repair and maintenance activities: the customers’ ability to take care of the product (if they see it as easy or hard) and their motivations as linked to

⁷ Design for Behaviour Change is concerned with how design can shape or influence human behaviour and sustainable innovation (Lockton, Harrison, & Stanton, 2010; Niedderer et al., 2014).

nine areas that are related to "the product itself (financial aspects, pleasure, functionality, aesthetics), the consumer (intrinsic motivation, rebellion against the brand policy) or the relationship between the consumer and the product (fit with the participant's identity, irreplaceability, shared ownership)" (Ackermann, 2018, p. 5). In a similar vein, various authors explored how the dimensions of caring for one's possessions (e.g., affection, responsibility, commitment) play an important role in understanding the attitudes of end-users as regards ownership, disposal and reuse and, as such, can be taken into consideration by designers to extend the lifespan of objects (Baxter, Aurisicchio, & Childs, 2016; Bosserez & Verbeeck, 2018; Choi, Stevens, & Brass, 2018; Lilley, Smalley, Bridgens, Wilson, & Balasundaram, 2016). Vogt and Nunes reviewed some motivational factors for environmental behaviour, particularly examining a case study on recycling disposable plastics in six German hospitals (Vogt & Nunes, 2014). Results show that interventions that make it easier for everybody to efficiently handle waste at work (e.g., information from and feedback to staff, clear labelling and space for several waste bins, and eco-audits) are probable success factors that can drive toward more sustainable staff behavior.

Educational and communicational aspects are the central focus of other authors. Fassio described a website aimed at providing fine-grained information on food supply chains (Fassio, 2017). Such website provides a gamified environment in which end-users play the role of an entrepreneur and have to make choices as regards the supply chain (e.g., what kind of irrigation system to implement for their farm or what kind of ingredients to use when producing jam). Each of these choices potentially has consequences concerning the sustainability and circularity of the final product distributed to the market. Mugge and colleagues examined how visual information about prior use (e.g., signs of wear and tear and textual descriptions) has a negative effect on consumers' evaluations of refurbished electronics (Mugge, de Jong, Person, & Hultink, 2018). Vanhamäki and colleagues explored the opportunities of using information design to process and produce more understandable information about rural renewable energy possibilities and, consequently, to better meet the information needs of rural actors (Vanhamäki, Heinonen, Manskinen, & Kälviäinen, 2017).

The use of design to support policy and regulations oriented towards circular economy

Some other authors examined how design can support public administrations in creating policy actions and legislation that implement circular economy (e.g., D'Elia, 2018). Charter pointed that an important area of focus to develop more circular economies is in relation to "maximising materials value in the system for the longest time period, where waste is 'designed out' from the beginning. This will mean that radical new policy frameworks will need to be developed to enable the extension of the life cycle of product-services and packaging and the components and materials within them" (Charter, 2018, p. 2).

Benoy and Lehne provided an overview of emerging developments in circular economy policy worldwide, showing the variety of policy tools across entire material and product value chains and life cycles (Benoy & Lehne, 2018). Keiller and Charter looked at how bottom-up community repair organisations - such as the repair cafes in the UK - have influenced policy-makers to design more repairable products (Keiller & Charter, 2018). Cooper explored some key components of economic infrastructure for sustainable product design (Cooper,

1999). Such infrastructure should take into account areas such as the way in which economic progress is measured, the potential of fiscal reform to change the relative cost of manufacturing and after-sales services, the environmental objections to industrial concentration and free trade, and the need to increase products designed for the least possible environmental impact.

Barbero and Bicocca reported on an Italian circular economy project that aims at fostering a design-driven and collaborative engagement of universities, local authorities, government offices, associations, public bodies in a joint attempt to adopt a more systemic view and a broader approach in territorial development (Barbero & Bicocca, 2017).

Other reflections on design theories and frameworks for circular economy

Last but not least, some other authors more broadly looked at the theoretical aspects of design for circular economy and proposed some general frameworks (i.e., not specifically related to the supply side, to the demand side or to regulation and policy). The already cited work of Ceschin and Gaziulusoy (2016) is a good entry point for theoretical considerations on how the various design for sustainability concepts refer to circular economy. Similarly, the work of Madge gives an extensive and historiographical review on design and its environment in all its definitions (Madge, 1993).

Coulson and Woods proposed a Circular by Design Canvas tool, developed to help SMEs think strategically about the application of circular approaches to their business (Coulson & Woods, 2016). Munthe-Kaas & Hoffmann (2017) looked at compositionist design as a way to create "things" - collectives of humans and non-humans (Telier et al., 2011) - and at how compositionist design can support public participation and inclusion of citizens in urban planning. One of the cases analyzed by the authors is a two-year experiment staged to develop knowledge, skills and practices for the management of a 'resource centre' based on the concept of circular economy. Cong and colleagues proposed a design method to improve end-of-use product recyclability through a sequence of steps that evaluate various end-of-use scenarios and then analytically define which components of a product are more suitable to be disassembled, recycled and reused (Cong, Zhao, & Sutherland, 2018). Mestre and Cooper presented a conceptual framework to identify various life cycle strategies in circular product design (Mestre & Cooper, 2017). Particularly, the framework is a way to look at technical cycles - i.e., "technical and/or technological use and transformation of material and energy resources, and their design optimisation to the highest possible levels of efficiency" (p. S1624) - and at biological cycles - i.e., "the biological design solutions occurring in (or inspired) by the natural ecosystems, in which materials are cycled in nature over time" (p. S1624). The paper provides some examples on how this conceptual framework can be productively used to frame circular economy design interventions. Reitsma and colleagues explored the use of stories from the Climate Fiction genre as a dialogical tool to engage experts and various other stakeholders in the discussion of moral, ethical and societal issues in the transition towards a low emission society (Reitsma, Wessman, & Önnqvist, 2017). Goldsworthy presented a framework that helps designers to better design circular fashion products while considering multiple rhythms and speeds within a product's entire lifecycle (e.g., slow and fast fashion speed) (Goldsworthy, 2017).

Siemieniuch and colleagues looked at how some global drivers (population demographics, food and energy security, resource depletion, emissions and global climate) are going to affect sustainability in manufacturing (Siemieniuch, Sinclair, & Henshaw, 2015). These drivers are going to push towards more circular models that will place higher demands on the workforce and their ability to manage complexity, large-scale and cross-disciplinary approaches and an increasing high number of virtual work platforms and extensive human-machine and human-system interactions. As such, a significant input from the fields of ergonomics and human factors is expected.

Discussion and final remarks

At this stage, we consider this survey of design research contributions that specifically focus on circular economy as preliminary and we hope that our effort might prompt other researchers in pointing to some of its shortcomings and, possibly, in working together with us on further versions of the review. In the meantime, we can share some considerations as emerged from the current review process and highlight some areas of interest.

The need to integrate different disciplinary fields while academic research is still at an emerging phase

While current discussions on the circular economy concept are prevalent in the policy and business development debate, academic research is still emerging and fragmented (Korhonen, Honkasalo, & Seppälä, 2018). Key concepts, frameworks and approaches of circular economy still need more in-depth and critical discussions as the “basic assumptions concerning the values, societal structures, cultures, underlying worldviews and the paradigmatic potential of circular economy remain largely unexplored” (Korhonen, Nuur, et al., 2018, p. 544). The literature in design research proposes a variety of studies surveying existing cases and proposing frameworks and methods, but it often lacks deeper theoretical considerations elaborated by closely linking research across as diverse domains as natural and social sciences. As such, the risk is that within design research the concept of circular economy becomes “reified” (Lane, Koka, & Pathak, 2006), i.e., taken for granted and used without taking in consideration the critique that circular economy has received in other disciplinary fields. As an alternative, we suggest a deeper investigation of circular economy across disciplinary domains as a way to introduce a richer - and, possibly, more shared - vocabulary to look at the phenomenon.

Beyond the simplistic idea of circular economy as a holy grail

Various authors pointed to the links between some of the current approaches toward circular economy and the dominant neoliberal political and economic landscape (Ceschin & Gaziulusoy, 2016). As such, circular economy has been seen as a way to develop more sustainable business models and entrepreneurial processes, possibly laying the foundations for renewed growth-driven economic strategies (Valenzuela & Böhm, 2017). Circular economy, in other terms, can be seen as a way to decouple economic growth from environmental impact (Ghisellini et al., 2016). Design researchers should more clearly acknowledge such critique and position their work against this political background.

Underexplored areas in current research

Our review showed that current research has some preferred areas of investigation. A good number of contributions explore how design can optimize the supply side and the demand side. However, fewer contributions look into how design can contribute to better policies and regulations. In addition, there seems to be a higher number of contributions studying specific geographic areas (e.g., the UK) or industry sectors (textile and fashion or consumer electronics). Future research might want to look into currently underexplored areas.

Harmonization of frameworks and methods

A number of authors proposed theoretical frameworks or methods to support more circular design. A deeper review of such frameworks and methods will probably help design researchers and practitioners in assessing their potential and limitations and possibly improving the existing frameworks and methods rather than always proposing new ones. A more harmonized theoretical and methodological array of possibilities could be of great support for those education programmes that want to embed circular economy in their curricula.

Going beyond the construct of circular economy

An obvious limitation of this article is that it only reviewed those contributions that contain the words 'circular economy'. Readers who are familiar with the past decades of design studies broadly related to environmental sustainability might feel that some of the more recent scholarly contributions use the construct of circular economy to re-state what has been already said in past literature using different constructs. By acknowledging this limitation, we invite future research in extending the gaze and looking at the rich scholarly heritage in this area as to put in a wider context the novelty and the relevance of some current contributions exploring the notion of circular economy.

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The pedagogical potential of game-designed transmedia narratives at university

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Abstract

Since 2017 the School of Communication Studies and Multimedia Design at Maimónides University, Argentina, has undertaken a research program exploring the relationships between game-design and transmedia narratives, along with possible implications of its strategies in the educational field, especially for the academic and professional training of Multimedia Studies undergraduates. Using various methodologies, research was conducted where students of three different courses were asked to undertake practical work embracing the aforementioned strategies in different subjects. This proposal intends to prove that students can study how to create new narrative universes while learning more specific concepts and topics according to each course and each syllabus. Different ‘prosuming skills’ were put into practice: transmedia production, individual and social content management, media and technology analysis and narrative and aesthetic studies. Hence, when working in the construction of their own narrative universes or when analyzing products that they consume daily, learners accomplished all that was set out to do approaching the practical assignments with a new perspective, prompting creative impulses and meaningful interactions among peers and teachers favouring learning.

Authors' keywords

Transmedia storytelling; game-design strategies; transmedia literacies; innovative pedagogy; action research.

Introduction

Transmedia storytelling represents an exciting challenge reconfiguring designers, producers and consumers' roles. However, what may seem a complex task for a traditional producer is a classic game-design problem for someone whose professional performance is devoted to video games design. Thus, interactive scripts and non-linear stories are fundamental parts of any video game. Therefore, every producer in the industry can use these strategies to develop these new narrative forms.

From the designer's point of view, when we think of transmedia storytelling, we have nothing more than a colossal narrative game in mind. And what is more interesting is that the audiences, especially much younger generations, have consumed and participated in communities where these strategies have been deployed for years, modifying their ways of seeing, interacting, communicating and even learning. As Scolari (2018a, p. 14) holds, "the traditional media consumer is now a prosumer or participatory creator, an active subject who creates new contents and shares them in the digital networks". Thus, this role challenges us as educators.

Since 2017 the School of Communication Studies and Multimedia Design at Maimónides University, Argentina, has undertaken an extension program exploring the relationships between game-design and transmedia narratives, along with the possible implications of its strategies in the pedagogical field. Although extracurricular workshops were aimed at producers, scriptwriters, journalists, designers and other professionals from the creative industries; evidence showed the developed strategy could also be useful to promote students' learning process as well.

During 2018's academic year a research was conducted aiming to explore the pedagogical potential of these game-design strategies in the analysis and design of transmedia universes for teaching different disciplines within the framework of the academic and professional training of multimedia undergraduates. Using various methodologies, students of three different courses were asked to carry out practical work that embraced the aforementioned strategies in the following subjects: Interface Design, Advanced Design, Communication Studies and Video Game Design.

In order to achieve the above-mentioned main goal, the following research questions were addressed: Which were the aims of the different assignments and how did they apply the transmedia world-building strategies? Which transmedia literacies were taken into account on each assignment and discipline? Which transmedia literacies were the students able to identify through their learning process?

Literature Review

What do transmedia storytelling and video game design have in common?

Video games analysts have studied how narrative strategies can be related to creating new games, or as Frasca (1999) has said: What happens when ludology (a discipline that studies game and play activities) meets narratology? In a clarifying article Zimmerman (2004) wondered in what ways gaming might be considered a narrative *thing*. Nowadays we cannot deny that the game industry has explored how to introduce narrative structures and strategies to game design, especially when linked to interactive design.

Jenkins (2005), the transmedia storytelling specialist, describes four ways in which video games, through environmental storytelling, create the pre-conditions for an immersive narrative experience:

1. Spatial stories that can evoke pre-existing narrative associations, in a direct relationship with world-building.
2. Enacted stories, where the player is an eye witness of the narrative events.
3. Embedded narrative: as they move through the story, viewers test or reformulate their mental maps of what they think could happen next.
4. Emergent narratives which are not pre-structured, not pre-programmed: they take shape throughout the game.

This is why Jenkins (2005) established that game designers are less of storytellers than narrative architects. Video games do tell stories, but not in the same ways as other media do. If we consider transmedia storytelling as a colossal narrative game, its strategies are likely to be similar to game-designing rather than those used by traditional narratology. Therefore, from the producer's point of view, the transmedia narrative has a similar structure to any game, even when there is no game intended in the system (Nallar, 2016).

Designing a transmedia narrative, the components that should be taken into account are such in which any video game is based on: goals, challenges, rewards and pauses (and their interdependence), and the difficulty curve, or in the case of a story, a progress curve (Figure 1). This structure lets us design the different windows of a project, with their respective strategic gaps, migratory cues (Ruppel, 2005) and expansion map, all of them consequently taking place in the same universe or world.

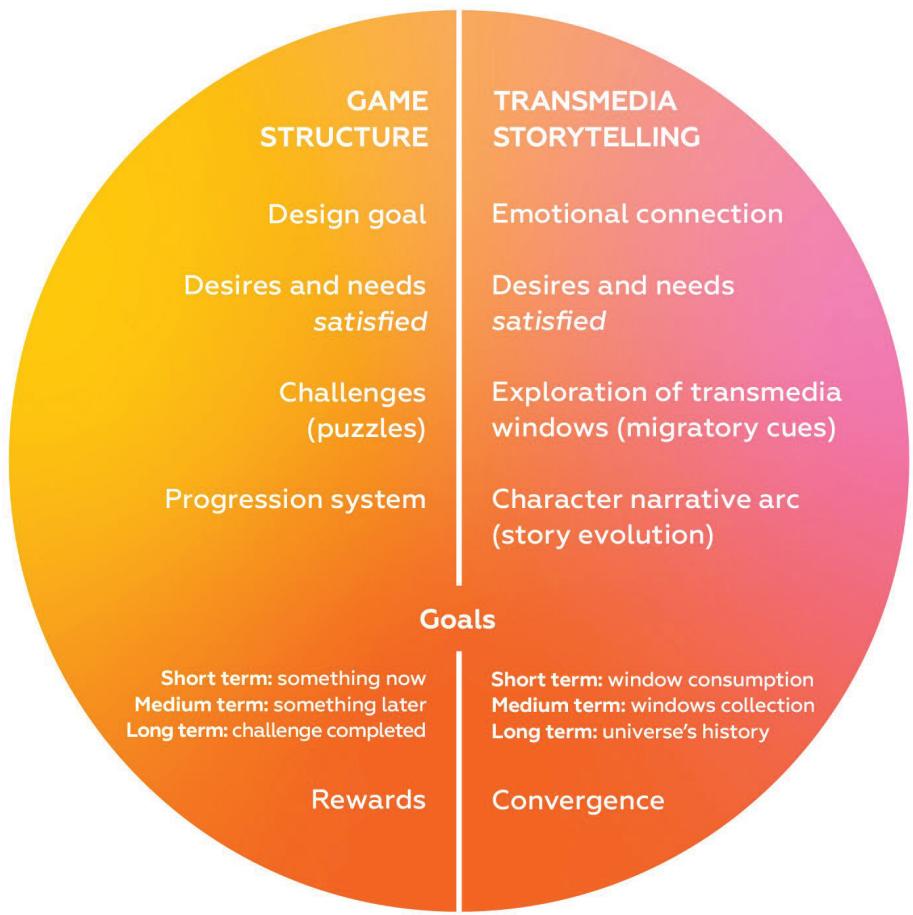


Figure 1: Relationships between the structure of every game and transmedia storytelling

Goals

Every video game has three types of goals: short term, medium term and long term goals. This means the players need to do something now, something later and something to finish and win the game.

Similarly, in transmedia storytelling, the audiences need something to consume first (watch a short animated film or read a comic); then the public need more information by consuming more parts of the story in other media; and finally, they learn the whole universe story. Only going through all the stories that entangle the narrative universe, will the prosumers (Toffler, 1980) be able to achieve the long-term objective.

Challenges

We call challenges when referring to the problems and obstacles that a consumer has to overcome and/or understand to achieve the goals aforementioned. In a transmedia narrative, the challenges can be the mysteries and puzzles (or Easter eggs) that must be solved i.e. in the stories of *Choose Your Own Adventure* style, the challenge is to make up a decision (the goal is usually to "get to the best end" without dying horribly). Each time you ask the reader to choose a path, you challenge their astuteness and luck. A narrative game offers those kinds of obstacles. Overcoming these barriers get the participant closer to the final goal.

Rewards and breaks

The rewards are given to the public at specific times, strategically distributed according to a scheme that we borrow from behavioral psychology (Nallar, 2015, Skinner, 2008). The goal is to motivate the viewer to stay active.

Amongst rewards there is a blank area called pause. Pauses are dangerous because it is when the spectators tend to leave the game or the story. To avoid this, we should insert tasks of less or equal weight during these breaks. But to get the intended effect, rewards must depend on each other. This is what we call rewards interdependence.

In transmedia storytelling we can establish this mechanism of interdependence when we insert other elements among the pauses, such as teasers or social media contests, where audiences can get more rewards, without disturbing the understanding of the stories or the non-linear order of each window. In Figure 2 we can find an explanatory diagram of what we call a "rewards map".

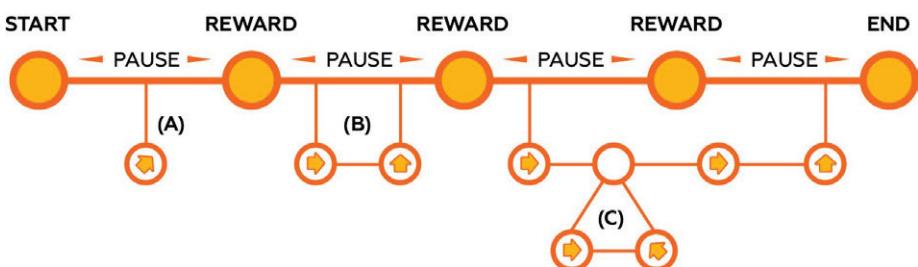


Figure 2: Rewards map

Progress curve

Every game displays a difficulty curve, which is linked to the progress of the game. The gameplay becomes more challenging as the players progress because it accompanies the natural growth of their abilities. In transmedia narratives, this also often happens: the public – in particular, the prosumer – experience progress as the challenges grow. Because of this, newer fictions

tend to be more complex - more dramatic and with more intricate arguments - and such bring the audience closer to the long-term goal.

World-building techniques

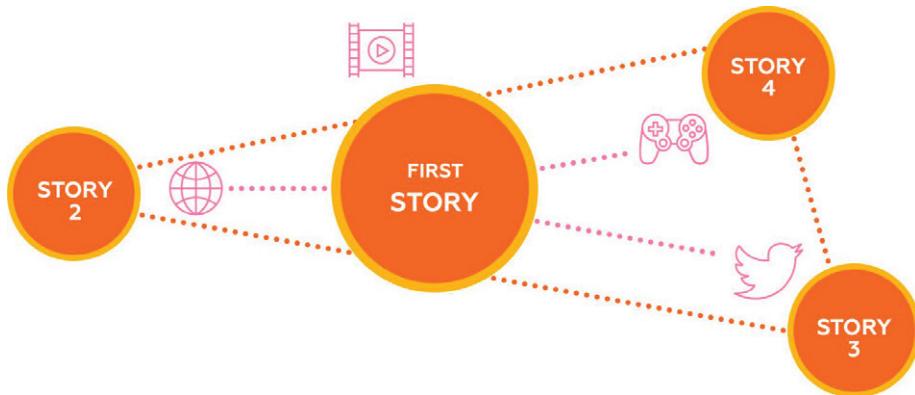


Figure 3. Expansion map of a narrative universe

The story told by a transmedia narrative is the story of a world and its protagonists: a narrative universe. To tell a great story covering a whole world, we create different auto-conclusive stories (Figure 3). These may have the same protagonists or different ones. They can happen in the same time period or in different ones, but always in the same universe. The audiences, then, swap their passive role and become information hunters. As they gather data, consuming individual stories in different media, the universal history converges (Jenkins, 2006) in their minds.

The technique used when telling a transmedia story contemplates the inclusion of gaps in the script, along with signals that consumers and prosumers can follow in their search for information. The strategic gaps and the migratory cues (Figure 4) are two key tools in the designing of a transmedia narrative. The distribution of both elements along with the project generates a pattern similar to the one used by narrative games or riddles. (Nallar, 2016).

Within this framework, we have to rethink the way we used to understand world-setting. In this context, the world is a larger character, but equally complex. Any transmedia universe must be designed from its genesis to its extinction (Figure 5).

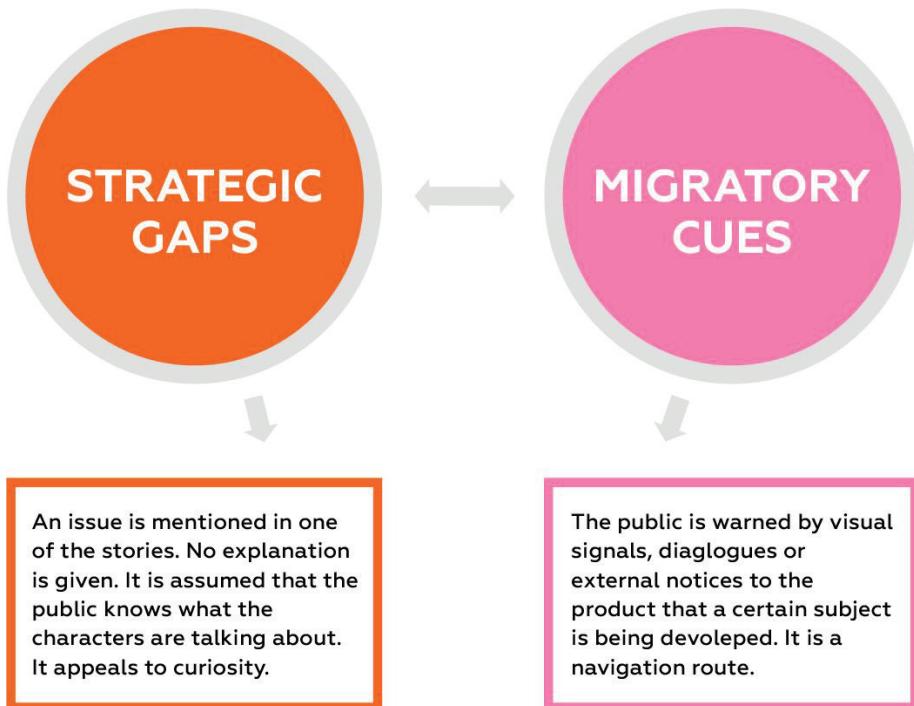


Figure 4. Strategic gaps and migratory cues

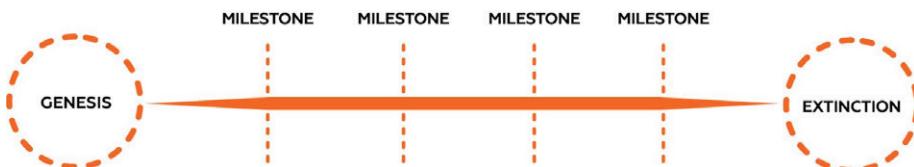


Figure 5: Narrative Universe and its milestones: from genesis to extinction.

Multimedia students were asked to embrace all of these techniques in order to undertake the assignments in four different subjects. What we intended to prove is whether or not the aforementioned strategies could also be useful to promote students' learning process along with the development of several transmedia literacies as well.

How do we connect game-design transmedia storytelling with education?

Before answering this question, we need to answer why the public adopts these new forms of consumption. Is it the way to consume stories or the media what changed or is it the way of producing content?

On the one hand, younger generations tend to jump between ephemeral pieces of information, developing changes in their attention economy (Grainge, 2011). Igarza (2009) points out although there are multiple factors for the development of new forms of consumption, one of the main ones is the revitalization of the historical tension between leisure and production spaces:

'With the flexibilization of labour, the increasing frequent business trips and the growing incorporation of digital natives to the working force, time bubbles have appeared in which new media and mobile devices tend to play a leading role. The current situation is increasingly dominated by intermittent interpersonal communication and entertainment activities. Leisure slips between productive blocks, during waiting times, in between train stations. Leisure has become interstitial'. (Igarza, 2009, p. 12)

On the other hand, the diversity of choice the Internet and other services, such as on-demand television, enable changed the public habits and allowed producers to think of new ways of communicating with the audiences and one another. Or, as Pamela Rutledge (2017) states, the reason why we argue traditional marketing techniques no longer work is because social networks have created a new kind of psychology in the consumer. The consumer demands that we gain their attention, without being interrupted. There is a generation that prefers to take an active role when being entertained.

The third reason why the public tends to adopt this way of consuming content can be explained as a necessity. According to the consultant Edelman (2017), in the 21st century we lived changes related to information technologies as never before. During the Shanghai Marketing Effectiveness Festival 2012, Edelman pointed out five aspects that changed and three that not.

What changed? The explosion of communication channels (social networks, mobile devices, smart appliances, etc.), the emergence of a multi-screen world, how all companies are adopting a media configuration, how the stories are becoming social and eternal, insofar as they persist and grow thanks to the community that shares them. What has not changed, despite the current information and communication technologies, is time and attention -historically finite-, the fact that we love a good story no matter what format it supports, and that 'content is king'.

As analyzed recently in the Transmedia Literacy research project (Scolari, 2018a) and earlier in previous literature (Jenkins et al., 2006), children, teenagers and young adults are developing new learning strategies that come across formal, non-formal and informal learning contexts.

Educators must intercept these learning experiences to not only analyze and reproduce this phenomenon, but also to develop new didactic techniques and tools to ‘work in harmony with the multiple learning contexts that young people experience, related to their personal interests and passions, therefore understanding, empathizing and adapting these experiences for educational purposes’ (Amici and Tadeo in Scolari, 2018a, p. 118).

However, as David Buckingham (Scolari, 2018a) says, media literacies are by no means a new idea. In the 1970s we can find examples of research and educational projects in the field of television literacy. In the early 1960s visual literacies were a common topic, and the idea that film requires a kind of literacy was being developed by Soviet filmmakers back in the 1930s.

All in all, understanding media is neither natural nor automatic: ‘it is not something that you learn just by using media. On the contrary, it implies that – as with any other traditional literacy – there is a process of more or less deliberate teaching and learning that needs to take place as well’ (Buckingham in Scolari, 2018a, p. 5).

Researchers and scholars of the Transmedia Literacy Project (Scolari, 2018b) identified a set of competencies defined as ‘prosuming skills’, which include the skills necessary to produce/create media contents. In this context, the concept of transmedia literacy can enrich what we understand as traditional media literacies. The current research intends to prove that game-design strategies and techniques can be used to promote transmedia literacies and skills.

Research Design

We based our methodology from an action research approach (Eliot, 1991) by creating project-based learning assignments that embraced the aforementioned transmedia game-design strategies. At the end of the academic year, in-depth interviews were conducted to gain a deeper understanding of the undergraduates developed ‘prosuming skills’ and learning strategies regarding video games, social media and user-content production.

Project-based learning assignments have not usually been used as an ethnographic research method; however, recent developments in this area (Akama et al, 2018 in Scolari, 2018b) show that they can offer a concise and coherent mode of developing short term non-traditional ethnographies that get under the surface of what we can normally ‘see’ by using observational methods.

Therefore, project-based learning lessons create situations in which we can use both traditional ethnographic methods (e.g. observation), participatory methods (e.g. asking participants to contribute to group work), and collaborative methods (e.g. discussing and resolving questions in small groups).

On the other hand, interviews are one of the most well established research methods in the social sciences (Skinner, 2013). They were an important element of this project as they enabled us to systematically probe under the surface if our students could tell whether or not they could learn from the syllabus and, at the same time, improve their transliteracy skills.

Accordingly, both the developed participatory learning environment and the conducted interviews provided four types of data:

1. The assignment and the evaluation grid each teacher created in order to identify the game-design world-building techniques used in each project;
2. The researchers' observations;
3. Notes, media or material artefacts produced by the participants;
4. The responses to the interviews and to the 'prosuming skills' questionnaire that both students and teachers completed.

Following these research procedures, every lecturer involved in the present study provided an assignment that included a game-designed activity to create a transmedia universe and apply the concepts and abilities, which were related to each syllabus.

Interface Design students had to design the graphical user interfaces of a system composed of, at least, 3 digital pieces: a video game for mobile devices, a platform or website and another choice. In Advanced Design, the assignment was to devise a transmedia communication strategy on the running for presidency of a member of a political minority party. Communication Studies learners were asked to analyze a transmedia project out of interest applying the concepts developed during the lessons. The result of these analyses was meant to be presented as a transmedia narrative in itself, using the game-design strategies to display and interpret the chosen case of study. In Video Game Design, senior-year students had to plan and develop a prototype video game by using all the transmedia game-design techniques. Thus, they were expected to build a whole new transmedia universe.

Throughout the academic year, not only did each teacher analyze if the students acquired what they are supposed to learn according to the subjects training programs, but also how they applied these strategies of creating game-designed world-building narratives while developing new transmedia skills. By the end of term, learners were asked to describe what they could recall from the assignments, whether they thought they had learnt transmedia world-building techniques and which transmedia literacies they believed they were able to learn or perfect.

To compare what the lecturers have observed from the students learning process with the young men and women's own perception, in-depth interviews were conducted. A detailed questionnaire that followed the set of transmedia 'prosuming skills' that were described by the above-mentioned Transmedia Literacy Project was built to accomplish such comparison (Scolari, 2018b).

Both students and teachers were asked if the undergraduates that completed the assignments were able to put the following skills and subskills into practice:

1. Production skills: This means if they could create and modify written, audio, drawings, designs, photographic and audiovisual productions, along with coding and modifying software, building and modifying hardware, and creating video games and making cosplay and costumes. Or if they could also use writing software and apps, audio recording and editing tools, drawing and design tools, photographic and editing tools, filming and editing tools, coding and ICT tools, to use tools for video game creation and modification.
2. Individual management skills: This means if they could manage their own identity and their own feelings and emotions.
3. Social management skills: This means if they were able to participate in social media, collaborate, coordinate and lead communities, along with teaching how to perform such abilities.
4. Content management skills: This means if they were capable of searching, selecting, downloading, managing content archives, managing content dissemination and sharing.
5. Media and Technology skills: This means if they could recognize, describe, compare, evaluate, reflect, take action and apply media and technology skills.
6. Narrative and aesthetic skills: This means if they were able to interpret, recognize, describe, compare, evaluate, reflect, take action and apply such skills.

It was crucial the fact that teachers could contrast their observations and experiences to the actual learner's point of view.

Research

The research consisted on analyzing the learning process of 36 students that collaborated in 15 groups. The outcome of all the projects was studied to describe the implemented game-design techniques. As a result, 20% and 30% of the undergraduates involved were interviewed at the end of the academic year in order to demonstrate a deeper understanding of the transmedia skills they have applied.

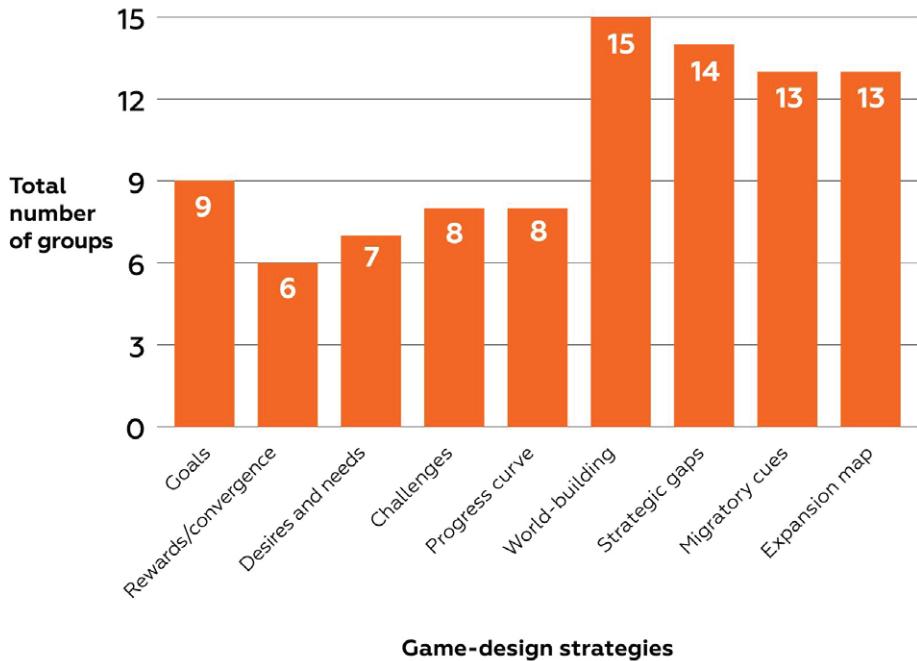
Table 1 describes the main characteristics of the sample of young learners that participated in the current research. Although the sample size might seem limited, it must be taken into account that the said sample represents the total of students that are enrolled in the 2nd, 3rd and 4th year courses of the *School of Communication Studies and Multimedia Design*.

Course	Ages	Subjects	Projects	Interviews
2nd year	19-20	Interface Design (11 students)	4	3-27%
		Advanced Design (11 students)	3	2-18%
3rd year	20-21	Communication Studies (8 students)	6	2-25%
4th year	21-22	Video Game Design (6 students)	1	2-33%
Total:		36 students	15 groups	

Table 1. Research universe.

Regardless of the subject and considering that all the assignments involved the use of the developed game-design methodology described in the Theoretical Review, not every group used every game-design technique. The only game-design strategy that was implemented by every group was the world-building technique. This means that every project was able to create the story of one fictional universe which allowed participants to tell different stories. Consequently, all of the handed-in assignments created a story expansion map as well.

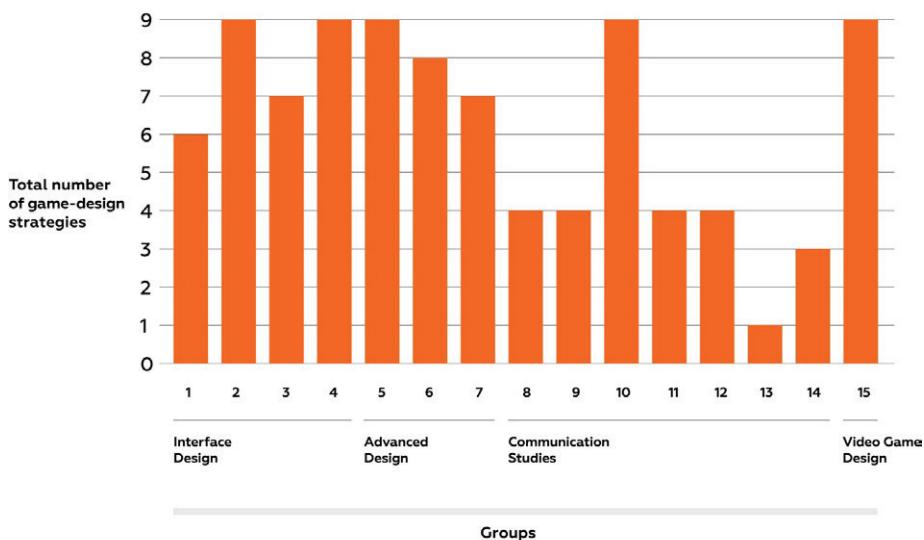
Between 86% and 93% of the projects included migratory cues and strategic gaps techniques. Furthermore, half of the groups were able to establish a goal; these individuals presented a reward strategy and also created a progress curve of difficulty. Only 40% could describe the desires and needs their transmedia project was intended to satisfy.



Graphic 1: The most implemented game-design strategies

Graphic 1 presents the game-design strategies that were implemented the most. Accordingly, Graphic 2 compares the total number of strategies that were applied by each group. Taking into consideration that in Graphic 2 we can identify which project responds to each subject, a general analysis can be made relating the subject to the possible game-design strategy.

Nevertheless, in every case, the students managed to fulfill their projects and learn the syllabus presented by every subject. Hence, in spite of gaining different marks, 100% of the undergraduates could pass the assignment.



Graphic 2: Game-design strategies implemented by groups

The in-depth interviews were conducted in order to discuss their learning process with the participants and the efficacy and accuracy they may have found in the above-mentioned assignments. Every interview ended with a questionnaire of transmedia ‘prosuming skills’ and sub-skills that teachers considered to be important in the training of a multimedia graduate. The transmedia ‘prosuming skills’ (Scolari, 2018b), as mentioned above, were transmedia production, individual and social content management, media and technology analysis and narrative and aesthetic studies.

Graphic 3 shows a comparison between the skills each teacher expected students to acquire during the development of each exercise, and the skills students considered that they have put into practice. As the graphic shows, despite some literacies being expected to be achieved and the students being unable to identify, some others skills, which were not promoted by the teachers, were highlighted by these young men and women.



Graphic 3: Comparison of applied transmedia skills according to teachers and students per subject.

Considering the singularity of each subject, not every set of skills was expected to be fully applied. Content management and narrative skills were the most expected and also the most applied. Individual and social management skills were the most unexpected but the undergraduates did recognize the necessity of mastering these skills in order to achieve the required results when analyzing their own work.

Discussion

Given that all the assignments involved the use of game-design techniques, the results showed that the undergraduates were capable of developing transmedia literacies, whilst studying different subjects and syllabuses. Nonetheless, as graphics 1 and 2 in the previous section reveal, not all the projects were to have implemented all the described strategies.

This issue might pinpoint, at least, two reasons. On the one hand, some techniques can be more difficult to apply than others and, consequently, students needed more time and practice to improve their performance. On the other hand, as the projects they have developed were only meant to be used in

the classroom, some of the game-design techniques could have not seem relevant to the students at that stage of development.

It should be noted that applying most of the world-building techniques did not guarantee an excellent performance in the assignment for different syllabuses were being assessed. Notwithstanding these findings, we do believe that the implemented game-design strategies were crucial to the evolution of the students learning process. Using previous assignments that did not involve the use of these game-designed transmedia strategies as a baseline, we can recall that students might not performed much better in terms of applied knowledge. However, these strategies provided a step-by-step guide that the undergraduates were able to enact and help them accomplish their goals.

Each assignment ended up a better organized result and more regular progress was made week after week. Overall, the proposed strategies provided a structure related to the content and media the participants know and consume, empathizing and adapting these experiences to educational purposes.

Regarding the transmedia literacies that were put into practice, it should be mentioned that most of the skills that were expected to be acquired by the students in those subjects were identified by the undergraduates. These individuals admitted that they could develop a better understanding of what they have learnt.

In general, as the syllabus of each subject was unique and considering that the interviewed students were from different courses and these candidates had created different projects, the skills applied varied in every case. For the subjects that included practising their designing abilities, the production skills and the narrative and aesthetics skills were more taken into account. For other subjects such as Communication Studies that needed an analytic approach, the content management skills along with media and technology analysis skills were expected to be applied more often.

As far as students were concerned, 3rd and 4th year learners could identify the skills more easily and reflect more deeply into different literacies applied during their learning process than those of 2nd year learners. Implementing the game-design strategies model made the learners aware of the need of a methodical and strategic plan of action which assisted them in developing individual and social management skills, even when teachers were not asking the students to acquire such abilities.

By and large, making the step-by-step creative process explicit allowed undergraduates to be conscious of the literacies that involved evaluating and reflecting on their own practice as well as their classmates' practices. The process in question enabled the possibility of putting new concepts and knowledge into action.

Schön (1992) has established that there is a paradox when learning design and media skills: students cannot, at first, comprehend what they need to learn. They can only learn by training themselves, and they can only train themselves by doing what they do not yet understand. Project-based assignments enable a process of self-discovery and putting such features of a professional profile into

action. Accordingly, when we learn a skill, we also learn the conventions, limitations, language repertoires, systematic knowledge of a community of practitioners (Schön, 1992). There lies the importance of developing innovative approaches to teach new skills and disciplines.

However, learning through exposure and immersion does not always develop knowledge consciously. We often find out that students become aware of what they have acquired a year or two later when these change contexts (Schön, 1992). We firmly believe that the created game-design strategy model and the transmedia literacies questionnaire have hastened such awareness by making not only the ways of doing but how these projects are being evaluated explicit. We also have discovered that the present-day study has not only helped students in such matter but the game-design strategy model together with the transmedia literacies questionnaire has been an excellent tool to evaluate the educational value of the assignments we have developed for our students as well.

Conclusion

The present research paper intended to describe the preliminary results of a current study program that involves the uses of a game-design strategy model in the creation of transmedia universes and its implications on training higher education multimedia students. The fundamental question that arises in this paper is what strategies we should develop in order to teach the next generation of multimedia students.

The study has shown that the game-design techniques were useful to guide and quicken the creative process of the undergraduates when applying new concepts and bodies of knowledge from different specific subjects while solving project-based assignments. Furthermore, changing lesson dynamics enabled students' involvement by creating a spontaneous and genuine emotional environment having decreased the usual uncertainty of the learning design paradox and increased the awareness of acquired skills.

The study has also proved that different transmedia skills were also acquired during this learning process. An evaluation tool emerged so as to analyze the success of such development. As some expected skills were not identified by students and some other skills were said to be developed in the doing and not taken into account by teachers, the literacy questionnaire can help lecturers create better and new assignments. Nevertheless, as not all of the game-design techniques were exploited, a different approach can also be developed in the following stage of our research program.

Final word

In order to boost the creative process of undergraduates, an integrated assignment could be solved throughout different subjects from different perspectives. It should be noted that parallel ad-hoc workshops should be implemented to coordinate teachers and learners' efforts.

We ascertain that this research will not only contribute to teachers at the School of Communication Studies and Multimedia Design in our country by presenting new design strategies and new ways of promoting prossuming skills, along with new ways of evaluating such learning tools, but this groundwork can also be an interesting case of study to pave the way for other design teachers all over the globe.

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Design Provocations

Redesigning Design Education in the Era of Design Capitalism

Design Culture Studies Understood in the Frameworks of Liberal Learning

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Abstract

In the age of the total aestheticization of the world – that is to say, in the frameworks of “artistic capitalism” (Gilles Lipovetsky-Jean Serroy, 2016 [2013]) – the arts and humanities and the idea of liberal learning are severely threatened worldwide. In this respect, several distinct scholars from Martha Nussbaum, Howard Hotson, Stefan Collini, Helen Small to Fareed Zakaria (Nussbaum, 2010; Hotson, 2011; Hotson, 2013; Small, 2013; Collini, 2017 and Zakaria, 2016) have recently been drawing our attention to a global higher education crisis in which the hegemony of market fundamentalism and neoliberal dogmas are subverting the basic tenets of liberal learning and education. Since 2008, when the global financial crisis broke out, there has been an ever-growing conflict between the liberal arts and the “neoliberal arts” (Deresiewicz, 2015). The threat of deregulation, liberalization and privatization – going hand in hand with the abolition of tenure, the commodification and vocalization of higher education and the phenomenon of parallel campuses overshadowing classical campus life with precarious temporary jobs, trainings and internships – foreshadows a frightening future for the humanist ideals. Contrary to this mainstream, following the foundational ideas of László Moholy-Nagy, Nigel Cross and Richard Buchanan in the field, this theoretical paper – in the form of literature review (Literaturbericht) – strongly argues that in the future, design culture studies must be more critically grounded and fundamentally conceived in terms of liberal education and learning instead of vocational education and training. With this prerequisite in mind, it intends to show the urgent need for a new generation of critical designers that could cope with recent and future challenges posed by the highly unsustainable world of design capitalism.

Author Keywords

Global Crisis of Higher Education; Design Capitalism; Design Culture Studies; Designerly Ways of Knowing; Liberal Learning; Liberal Arts; Humanism.

Introduction

In order to identify the legitimate need for critically grounded and liberal design culture studies one must establish that this post-disciplinary field of interests provides genuine new knowledge that differs from those nurtured by the natural sciences or the humanities and social sciences. (Margolin, 2013, 406.) This new knowledge might bridge the gap between “two cultures” represented by “literary intellectuals” on the one hand and “scientists” on the other (Snow, 1959 and Leavis, 1962), or in contemporary terms, between representatives of STEM (science, technology, engineering and math) and IDEA (intuition, design, emotion and art).¹ In doing so, critical and liberal design culture studies should be able to train its students in verbal, numerical and design codes at the same time putting together the trivial (verbal) and quadrivial (numerical) knowledge of the liberal arts with designerly ways of knowing, thus providing frameworks for a new encyclopedism that could cope with the highly complex challenges of global structural crises arising (Buchanan, 1992; Cross, 2006 [1982]).

Design Culture Studies

To be sure, the study of design culture is not restricted to a proper discipline in terms of strict disciplinary rigour, but to a heterogenous field of post-disciplinary discourses with respect to design and culture. One of the earliest promoters of design culture (*cultura di progetto*) in the English speaking world was the Italian Maurizio Vitta, according to whom this phrase was intended to “suggest the totality of disciplines, phenomena, knowledge, analytical instruments, and philosophies that the design of useful objects must take into account”, inasmuch as these designed objects are produced, distributed, and used in highly complex and elusive economic and social contexts. A general theory of the culture of design did not yet exist in the mid-eighties, however, a need for it was felt by designers facing problems that involved broad “cultural questions” being rather “remote from the traditional scope of design”. Parallel to this, Vitta called for an attitude which considered a certain “mirror-image theory of the object” that understood the purpose of designed, produced, and distributed objects from the point of view of consumption, possession and use providing a key role to consumers and users in the biography of objects, and so in the design process more broadly understood (Vita, 1989, 31.) Guy Julier – who is probably one of the best candidates for being the author of a general theory of the culture of design that was missing in 1985 when Vitta entered the international scene – defined design culture in 2008 as an object of study which “includes both the material and immaterial aspects of everyday life” implying that “on one level it is articulated through images, words, forms and spaces”, but at another “it engages discourses, actions, beliefs, structures and relationships.”² His longer working definition goes like this:

“A concept of design culture embraces the networks and interactions that configure the production and consumption of the artificial world, both material and immaterial. It lies at the interface between object and individual user, but

1 The second abbreviation is from John Maeda (Polaine, 2011, 43).

2 In the 3rd edition this remained the same, see Julier, 2014, 9.

also extends into more complex systems of exchange. It describes the normative actions, values, resources and languages available to designers, design managers and policy-makers as well as the wider publics that engage with design.” (Julier, 2014, xiii.)

Without going into further details of the genealogy of the field, I openly claim that design culture studies *stricto sensu* can be considered now as design history understood after its own cultural turn in terms of cultural anthropology, material culture studies and cultural studies among others. *Lato sensu*, however, it can be conceived as an umbrella notion covering every discourses, practices and products of design as it was already discussed by Victor Margolin whose model for “cultural approach to design studies” proposed four core topics to it: 1) design practice, 2) design products, 3) design discourse, and 4) metadiscourse. The first of which covers social actions in relation to the conception, planning, and making of products. The second deals with the identity and interpretation of these cultural products. The third and fourth are concerned with verbal reflections on design practices and products, and on design studies as a whole. Margolin was eager to show the substantial interdisciplinarity of this emerging field stating that 1) design practice had to be studied by methods and techniques taken from sociologists, anthropologists, psychologists, and other social scientists, whereas the understanding of the identity, and the interpretation of 2) design products needed techniques taken from semiotics, rhetorics and aesthetics among others, and therefore art and design history, philosophy, anthropology, cultural studies, material culture, science and technology studies had to provide methods in this respect. As for the study of 3) design discourse being the “locus” of design philosophy and theory as well as criticism, Margolin claimed that literary theorists, philosophers, and critics of art and architecture had to be invited to the field. With respect to 4) metadiscourse, historiography, critical theory, and the sociology of knowledge are mentioned among others.³ (Margolin, 2002, 253-254.) It has always been a hotly debated question ever since the beginnings – say, from the time of Clive Dilnot's seminal two-part essay, *The State of Design History* (Dilnot, 1984) – whether design history or its equivalents had to be subsumed within design studies – as in Margolin's mind –, or it had to be nurtured as an autonomous field of study. Recently, the Norwegian design historian, Kjetil Fallan has raised the issue with fervour:

“Is design history becoming a field of academic scholarship in its own right, or is it the fate of design history to provide context, legitimacy, and inspiration to design education and practice? Despite the major advances made over the last decades, the latter rationale shows a disturbing tenacity.” (Fallan, 2013, 13.)

Confessing to be an “anti-instrumentalist” Fallan severely opposes those attitudes which regard design history a “tool for better design” providing best and worst practices of the past for the future generations of designers. Properly speaking, Fallan with identifying design history as part of historical scholarship rather than being subsumed within design studies clearly refuses the idea that design culture studies is a maidservant of design practices implying that if there

³ The latter two categories can easily be grouped into one according to John Walker's conception of the “infinite regress of meta-languages” (Walker, 1989, 14-15). In doing so, Margolin's model can be reduced to the good old Aristotelian triad of 'praxis', 'theoria' and 'poiesis' (Szentpéteri, 2014, 10).

is no independent blue skies research in the field, than there is no service to design at another level of design education at all. Further to the refusal of this rather old-fashioned and still lingering commonplace of *ancilla*, he also strongly opposes the idea of *historia magistra vitae est*.⁴ To his mind, design history must be understood in terms of the humanities and social sciences, because its intellectual position is “more dependent on a running dialogue with” them “at large than with design practice/education/research.” (Fallan, 2013, 17.)

Culture

Regardless whether design history understood as the intellectual-and-cultural history of design is subsumed into design studies or pursued autonomously; or design culture studies is understood in restricted terms as the intellectual-and-cultural history of design or as an umbrella project covering all design discourses, practices and products, one can conceive design culture studies in terms of cultural anthropology, material culture studies and intellectual-and-cultural history among others. As a result, all kinds of design culture studies will be about the “ways of life” that could be illustrated with a metaphor of coin with two sides. First, that of designed environments with their material realities and physical spaces felt by our bodies, and secondly that of corresponding myths, narratives and discourses with their mental spaces open to our mind. (Bachelard, 1994 [1958]; Shusterman, 2008 and 2012; Gumbrecht, 2004.) At the same time, however, there must be place for more traditional understandings of culture stemming from liberal humanism that sees it as the cultivation of the self (Bildung) or character building, and this is one of the most important reasons to conceive design culture studies more in terms of liberal education and learning than that of vocational education and training. This philosophical attitude can best be exemplified by the 20th century Hungarian literary historian and novel writer, Antal Szerb who was a great admirer of John Cowper Powys, the author of the then very influential *The Meaning of Culture* (1929) which offers a very witty definition of culture in its Preface. “It is perhaps unwise to attempt any single dogmatic definition of culture [...] One felicitous definition runs as follows – ‘Culture is what is left over after you have forgotten all you have definitely set out to learn’ – and in this sally you get at least a useful warning against associating culture too closely with the academic paraphernalia of education.” (Powys, 1930 [1929], 11.) This is how Szerb summarizes Powys’ thoughts in his *Contemporary Man and Culture* from 1936:

“Real culture is the question of life. A truly cultured man does not separate his life from his culture. The two are mingled instead. His life experiences are forged and made conscious by his cultural impressions and in turn his readings become lively by means of his experiences. [...] He reads because he feels that with the help of his readings his life blossoms ineffably. This way he can arrange his impressions which would otherwise remain in a swirling and non-transparent chaos, he understands the real inclinations of his nature, and the real springs of his passions become appreciated by him. He sees people whom he meets in a more complex manner, he can imagine their lives much better, since reading has taught him how to see foreign lives from within. Landscapes, objects, the events

4 The original phrase stems from the Middle Ages as follows: *Philosophia ancilla theologiae est*. On *magistra vitae* see Cicero, *De Oratore*, II, 36. On *ancilla* and *magistra vitae* in design studies see Margolin, 2002, 252, 254.

of our world all receive greater perspectives while he recognizes the history of things behind the things by means of his culture. Thanks to his associations of ideas he sees everything hundred times more colourfully than he who did not enrich his imagination with books and images. Solitude – this incurable malady of our times – somewhat loses its strength, since it fills up itself with fluctuating life, in its abandoned room the spirits of great men moves around like the smoke of cigarettes. Real culture is a miraculous shelter in which one can find rest during the most unmerciful air raids of our fate. The goal of culture is this enrichment and autonomous security of our life." (Szerb, 1997 [1936], 198. Translation is mine.]

When I try to combine a cultural studies style notion of culture with that of liberal humanism, naturally, I intend to eat my cake and have it in the very same time, proverbially speaking. It is perhaps easier to understand my goal if we have a look at how Roger Scruton deals with this issue. Scruton when differentiating Herderian *common culture* and Humboldtian *high culture* from *popular culture* he picks up the telling example of toothpaste asking whether it belongs to culture. In the frameworks of common culture, toothpaste is not part of culture, but civilization. As for high culture, its adherents would certainly refuse to regard this humble everyday object as part of culture. For them, toothpaste only becomes culturally relevant when it is deployed as an art object exhibited in a museum or gallery. On the other hand, the "professor of cultural studies will probably reply 'of course toothpaste is part of culture'. Since after all toothpaste is a way in which people form and express their social identity and the decision to use or not to use it is a decision directed toward others. (Imagine America without toothpaste!)" – continues Scruton somewhat sarcastically (Scruton, 1998, 4). Without this sarcasm of an "old-fashioned Englishman" I strongly believe that the study of design is relevant in all the above approaches to culture. In favour of re-conciliating these attitudes I claim that cultural studies like notions of culture are more relevant with respect to the object and method of study, whereas culture understood in terms of liberal humanism is more pertinent to why we study design culture. This perspective foregrounds the thesis according to which design at universities is best taught in the context of liberal education and learning instead of solely being part of vocational education and training.

University

My cultural attitude becomes more understandable if I highlight how I conceive of higher education and university itself. Following Max Weber, Wilhelm von Humboldt, Niklas Luhman and Hans Ulrich Gumbrecht in their footsteps, I believe that learning at universities is about "counterintuitive insights", "improbable findings" and the courage to expose oneself to "unresolved problems" and "unpredictable intellectual trajectories". In this respect, the main characteristic of academic teaching at the university which is a "secondary social system" is "enthusiasm produced by the free interplay of professor and students" dealing with "unresolved problems" instead of "stable and unquestionable knowledge". This helps us producing "complexity" that could incessantly provide intellectual and cultural alternatives – or in current buzzwords: innovative ideas – for other social systems in crises and transition periods. These systems such as politics or healthcare are otherwise imbued with the "reduction of complexity offered by their environments". (Gumbrecht, 2004, 128-129.) The above way of

free knowledge production – or “risky thinking” in Gumbrechtian terms – against teaching received knowledge in order to train for a vocation is “the distinctive mark of a university” as the conservative Michael Oakeshott would put it (Oakeshott, 2001, 113). According to him, the university is a place where students have the opportunity of education in *conversation* with their professors, their fellows and themselves, and where they are “not encouraged to confuse education with training for a profession, with learning the tricks of a trade with preparation for future particular service in society”. Education is concerned with persons, not functions and if utilitarian aspects overcome conversation it “steals out of the backdoor with noiseless steps”. (Oakeshott, 2001, 113.) In Oakeshott’s mind, the university is a unique place of learning where the occupants primarily recognize each other as “learners, although they may be much else besides.” (Oakeshott, 2001, 10.) Learning at a university is not a limited undertaking to serve any extrinsic use, here “learning itself is the engagement and it has its own standards of achievement and excellence.” The university, therefore, is a special place thanks to its “seclusion”, and its autonomous detachment of the needs of everyday life and society. (Oakeshott, 2001, 11.) Learning, then, is an autotelic endeavour providing “adventures in human self-understanding”, and it is liberal “because it is liberated from the distracting business of satisfying contingent wants” (Oakeshott, 2001, 15). I fully appreciate that I am here referring to a very ancient, seemingly outdated view of knowledge for its own sake, however, I strongly believe in inspiring blue skies research without which intellectual autonomy would dissolve among the often ephemeral requirements of investors, and without which even profit-oriented applied research is inconceivable in the long run (Flexner, 2017 [1939]). As Howard Hotson argues, the pursuit of learning is intrinsically rewarding when it is about the wisdom of capacity to recognize the basic conditions of good life. The reduction of liberal education to the transmission of knowledge rather than the cultivation of this wisdom clearly puts this education into a servant position in which it loses every lively potential it has. Naturally, contemporary critics of liberal learning easily claim that the good old idea of the pursuit of knowledge for its own sake is a requisite of an outdated non-democratic era when higher education was the privilege of a small unit of rich leisured class. I completely agree with Hotson that this critique is absolutely misleading, since the “struggle to preserve scientific and academic values from subordination to the profit motive is being fought, not in defence of a learned, leisured class, but in defence of the idea that the pursuit of knowledge and understanding should be pursued as a public, rather than private good.” (Hotson, 2011; Hotson, 2013.) Well, maybe it is quite a Quixotic struggle to maintain this attitude when decision makers seem to be completely against it. Let me illustrate this with two quotations, one from a government paper, the other is from a scandalous interview with a former Hungarian vice-secretary responsible for higher education. In the *Convergence Programme of Hungary 2011-2015* among the *Measures of the Structural Reform Programme* one finds this rather disturbing statement:

“The main objective of the restructuring [of higher education] is to improve the competitiveness of the sector, to reflect the requirements of the economy and the labour market, to give preference to education in sciences and technical studies, to improve the training structure and to ensure the return of the cost of training.” (*Convergence Programme of Hungary*, 2011, 61.)

In complete accordance with the above, István Klinghammer announced the followings which do not need any further comments: "We should support and prefer those university courses which create value. Nowadays, natural and technological sciences create value. The humanities and culture are very important, but they do not create value, they delight human beings and provide happiness, on the contrary." ("*Intellectuals of the future cannot behave like this!*" Translation is mine.) Currently, under the aegis of the newly funded Ministry for Innovation and Technology (ITM) the entire public sector of higher education together with the Hungarian Academy of Sciences and its research institute networks have been threatened by pure market fundamentalism. According to these government plans every higher educator and researcher will soon be forced out from the public sector and hired as anyone else in the Hungarian job market under simple employment law. Besides this clear-cut example of the abolition of tenure it is also highly possible that universities will be run by curious state foundations in which business and management people and politicians seem to have the real say and not educators and researchers. (*Founding the 21st-century Hungarian Knowledge Industry*, 2018; 'Another leap in the Dark', 2018; Zgut, 2019.) Against such shallow utilitarian views extremely influenced by neoliberalism it is worthy to refer to Martha Nussbaum who in her seminal *Not for Profit: Why Democracy Needs the Humanities* speaks about a global crisis of education which grows silently like cancer and will most probably be far more damaging to democracy in the long run than the financial and economic crisis. She speaks about radical changes according to which democratic societies are abandoning fundamental cultural positions and discarding skills so much vital for their survival. In her mind if "this trend continues, nations all over the world will soon be producing generations of useful machines, rather than complete citizens who can think for themselves, criticize tradition, and understand the significance of another person's sufferings and achievements". The humanities and the arts are threatened the most regarded by policy-makers as "useless frills" that are not important for the competition in the global market, and therefore clearly eliminable from the curricula of universities and colleges, and from "the minds and hearts of parents and children". Correspondingly, "the humanistic aspects of science and social science – the imaginative, creative aspect, and the aspect of rigorous critical thought – are also losing ground as nations prefer to pursue short-term profit by the cultivation of the useful and highly applied skills suited to profit-making." (Nussbaum, 2010, 1-2.)

The New Liberal Arts

It is a truly tantalizing question how useful a graduate will be if she or he is only trained for a very narrow field of a profession momentarily required by ever changing, unpredictable market situations, but it is highly presumable that without wisdom, creativity and intellectual flexibility and resilience based on critical thinking, future graduates will not be able to adapt themselves to the challenges in the long run.⁵ This was already clear to the leading Bauhausler,

⁵ The MIT was among the firsts to recognize this: "The role of the humanities has been the subject of much recent debate amid concerns that the STEM disciplines [...] are eclipsing the humanities fields, in terms of relevance and career prospects. So, it may be reassuring to learn that here at MIT — a bastion of STEM education — we view the humanities, arts, and social sciences as essential, both for educating great engineers, scientists, scholars,

László Moholy-Nagy who in his summary of his pioneering design pedagogical activities in Dessau between 1923 and 1928 warned against the education of "sector-like human beings" (sektorenhaften Menschen):

"A human being is developed only by the crystallization of the sum total of his experiences. Our present system of education contradicts this axiom by stressing preponderantly a single field of application. Instead of extending our milieu [...] we concern ourselves only with one definite occupation—leaving unused other faculties [...] The specialists—like members of a powerful secret society—obscure the road to all-sided individual experiences, the possibility for which exists in his normal functions, and the need for which arises from the centre of his being. Today, the accent lies on the sharpest possible definition of the single vocation, on the building up of specialized faculties; the 'market demand' is the guide." (Moholy-Nagy, 2010 [1929], 555-556.)

In contrast to this ideal of sector-like human beings nurtured in vocational education, Moholy-Nagy urges the education of a universally minded "whole man" who is "equipped with the clarity of feeling and the sobriety of knowledge" and therefore "able to adjust himself to complicated requirements" of modern world "and to master the whole of life." Not surprisingly, Moholy-Nagy's way of thinking on design culture has a lot to do with such conceptions that conceive design in terms of liberal education and learning. Further to this, the way how Moholy-Nagy describes his educational views in *From Material to Architecture* (1929) and then in *Vision in Motion* (1947) gets quite close to the idea of design as the "third area" of education besides sciences and the arts or humanities, the issue of which was raised with great influence by Nigel Cross at the beginning of the 1980s. (Moholy-Nagy, 1947; Cross, 2006 [1982].) Referring to an RCA research project conducted at the end of the 70's, Cross drew his readers attention to the missing 'third area' of general education, namely to design. Doing this he also criticized the way how design had been solely conceived in terms of specialist education to his days:

"Our established concepts of design have always been related to specialist education: design education has been preparation of students for a professional, technical role. But now we are exploring the ways and the implications of design being a part of everyone's education, in the same ways that the sciences and the humanities are parts of everyone's education." (Cross, 2006 [1982], 3.)

In order to achieve this goal Cross tried to identify the intrinsic values of design education that "is not primarily a preparation for a career", nor is it a training in productive skills for the industry, following Richard Stanley Peters' conception of education as initiation into culture. (Cross, 2006 [1982], 6., Peters, 1965.) According to Cross, this is only possible if one identifies the peculiarities of the designerly ways of knowing that is rooted in the manipulation of non-verbal codes in the material culture. These codes mediate "messages" between the world of concrete objects and abstract thoughts and enhance the "constructive, solution-focused thinking" analogous to how other – verbal and numerical – codes channel "analytic, problem-focused thinking", and "they are probably the

and citizens, and for sustaining the Institute's capacity for innovation." See in detail <http://shass.mit.edu/news/news-2014-power-humanities-mit-commentary-dean-deborah-fitzgerald>. Accessed 28/01/2019

most effective means of tackling the characteristically ill-defined problems of planning, designing and inventing new things." (Cross, 2006 [1982], 10.) Cross identified five aspects of designerly ways of knowing: 1) designers tackle 'ill-defined' problems, 2) their mode of problem-solving is 'solution-focused', 3) their mode of thinking is 'constructive', 4) they use 'codes' that translate abstract requirements into concrete objects, 5) they use these codes to both 'read' and 'write' in 'object languages'. Having said that, he detected three main areas in order to justify the particular role of design in general education: 1) design develops innate abilities in solving real-world, ill-defined problems, 2) design sustains cognitive development in the concrete/iconic modes of cognition, 3) design offers opportunities for development of a wide range of abilities in non-verbal thought and communication. (Cross, 2006 [1982], 12.) If we appreciate how Oakeshott refused to use the notion of "general education" as opposed to "specialized" or vocational education – because he thought that it was "spawned" in reaction to the mainstream tendencies of a dominantly utilitarian culture and hence as part of a polar dichotomy the term remained in that dimension – we could replace the notion of general education in Cross' text with liberal learning.⁶ In doing so, we will also be able to widen the relevance of the designerly ways of knowing as phenomena that legitimize design education in the frameworks of liberal learning and education not only in grammar and high schools, but in colleges and at universities as well. This way, the importance of Cross for design culture studies will also be better seen. From this point of view Richard Buchanan's also classic but rather neglected words will also be quite illuminating: "design [...] should be recognized as a new *liberal art of technological culture*", no matter how it is unusual to regard design as such contrary to the mainstream understanding according to which the liberal arts are the common subjects of humanities and sciences institutionalized in colleges and universities at the moment. (Buchanan, 1992, 5.)

Conclusion

In the beginning of the 1990's Buchanan envisioned a "strikingly evident" revolutionary transformation of liberal arts, in which design had a crucial role, however, this revolution is yet to be happen. Anyhow, his conception has to be combined with such brilliant regeneration of the original idea of the seven liberal arts mutually pertaining to the humanities and sciences which is now flourishing in the premises of YaleNUS in Singapore as a tantalising example of a new encyclopedism (Zakaria, 70-71) that simultaneously introduces its students to the most exciting technological and scientific challenges, to the best innovative and creative industries, and to the fundamental traditions of humanistic character building and cultural interpretation. This new encyclopedism is painstakingly needed, since in the post-factual era of design capitalism, autonomous citizenship is now only obtainable by means of very complex knowledges that can read and write in verbal, numerical and design codes at the very same time. Only by means of such critically grounded and liberal design culture studies could we shed more light on the way how the "one dimensional" human being (Marcuse, 1991 [1964]) and its "society of spectacle" (Debord, 1994) [1967]) with a "culture industry" (Horkheimer-Adorno, 2002 [1944]) embodied in and expressed by design has been emerging and how neoliberal

⁶ See Timothy Fuller's introduction (*A Philosophical Understanding of Education*) to Oakeshott, 2001, xxi.

design culture, that is, contemporary design capitalism has almost completely alienated citizens of the Western world diverting their attention from real needs and responsibilities, especially in the case of the global ecological crisis that soon "changes everything" according to Naomi Klein (Klein, 2014). In the era of "Capitalocene" (Jason W. Moore, 2016), therefore, design education must be fundamentally redesigned in order to help creating a new generation of designers that could cope with recent and future challenges from the rise of national populism (Eatwell, and Goodwin, 2018) to the daunting spectre of artificial intelligence. This redesign process must be rooted in liberal education and learning, an ideal that has been so much indebted to the culture of resilience ever since its beginnings in the Medieval times, and which is now about to creatively incorporate the designerly ways of knowing as well.

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9. Cultural and Participatory Perspectives

Cultural and participatory perspectives have permeated the areas of practice and research in art, design and media fields. This conference seeks to bring together discussions and presentations from practitioners and researchers on how resilience and intelligence sustain, or are sustained by, cultural and participatory perspectives in art, design and media. How do environments, and specifically the Arctic environment, impact on resilient and intelligent cultural and participatory perspectives in art, design and media?

Academic Papers

Introduction of Service Design to Intangible Culture Heritage: the Redesign of Lotus Lantern in Qinhui Lantern Carnival

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Abstract

This paper discusses the possibilities of redesigning and exploration of traditional intangible culture heritage: Lotus Lantern in Qinhui Lantern Carnival. It attempts to incorporate the existing objects and activities into today's narrative framework by applying service design thinking. Lotus Lantern, as one of the intangible culture heritages of the world, is the unique historical product in Qinhui Lantern Carnival. Qinhui Lantern Carnival is part of the celebrations of the Lantern Festival over hundreds of years in the city of Nanjing. Lotus Lantern is not only an instrument to satisfy the lighting function, but also a symbolic expression of the spirit embodied in practicality, real life and praying culture. Although the annual Qinhui Lantern Carnival in Nanjing attracts a large number of people for visiting, the life of traditional Lantern craftsmen is unsatisfactory. Traditional lantern is also facing the danger of shrinking and dying out. The inheritance and transformation of its design is imminent. The value of service design lies in breaking the limitation of the traditional way of design and integrating innovative work into a narrative system. Starting from the study of the review of Lotus Lantern and Qinhui Lantern Carnival, this paper explores the logic of "Objects" and "Things" behind their historical context. Based on this logic, this paper explains the present dilemma which Lotus Lantern has faced. Then step by step, this paper shows the process of introducing service design thinking to this traditional industry and the possibility to bring making experience of the Lotus Lantern to the end user in Qinhui Lantern Carnival.

Author keywords

Service Design; Intangible Culture Heritage; Lotus Lantern; Redesign;

The logic of “Objects” and “Things” behind Lotus Lantern

Qinhuai Lantern is the generic term of all the lanterns in Qinhuai Lantern Carnival. The carnival usually takes place in the Lantern Festival in Nanjing, the capital city of Jiangsu province in China. Qinhuai Lantern has a long history, the process of its evolution and development is not only embedded in the development of Nanjing's history and culture, but also the selection of a production mode which is adapted to local conditions and self-sufficiency of people's livelihood. Lotus Lantern is one of the lanterns in Qinhuai Lantern made by craftsmen living along Qinhuai river (mother river of Nanjing, capital city of Jiangsu province in PRC today).

The embryonic form of Qinhuai Lantern originated from the palace lamps in the western Han Dynasty (202 B.C. -A.D.9). At that time, the emperors advocated Buddhism and often worshipped Buddha with lanterns, which were gradually evolved into the props of expressing ruling class's devotions to Buddha. However, the custom of expressing the devotions to Buddha had not been popularized among the public but been continued in the courtesy of ruling class. During the Three Kingdoms Period, Dongwu kingdom (A.D. 222-280) developed the custom of expressing the devotions to Buddha with a lighting admiration. In that period, the trade fairs along Qinhuai River became more and more prosperous, which made the custom gradually popularized. During the Six Dynasties (A.D. 222-589), Nanjing, as the cultural center of southern China, had become the habitation of a large number of literati, and scholar-bureaucrats. The custom of admiring the lantern from the ruling class quickly spread to the public through the praise of literati and scholar-bureaucrats. From then on, Qinhuai Lantern carnival had been developed because of its popularity. In Liang Dynasty (A.D.502-557), the most devout believer of Buddha, emperor Wu of Liang raised the number and scale much higher than before, the custom of admiring the lantern naturally fixed on the Lantern Festival. In the Southern Tang Dynasty (A.D.937-975), this custom was no longer to worship the Buddha, but became a festive, ritual activity in Lantern Festival. Although Qinhuai Lantern have encountered several bottlenecks in the history, the custom of admiring the lanterns as “Things” has remained. After the reform and opening-up of PRC, the central government attaches great importance to the development of intangible cultural heritage. And the governments at all levels spare no effort to create local specialties. As a result, Qinhuai Lantern and its festival have achieved today's reputation as “No. 1 in the Chinese world”.

Dynasty & Period	Things	Objects	Users
Western Han	Express the devotions to Buddha	Palace Lamps	The ruling class

Dynasty & Period	Things	Objects	Users
Three Kingdoms	Express the devotions to Buddha + admiration of lights	Palace lamps	Participants in trade fairs
The Six Dynasties			
Liang			
Southern Tang	Entertainment of lanterns	Qinhuai Lantern	The public

Table 1. the development of Qinhuai Lantern in history

From the historical and cultural origin, the development of Qinhuai Lantern has changed from the props of the ruling class' expressing the devotions to Buddha, from the props of the scholar-bureaucrats who imitate the rites and customs of ruling class, to the festival props of a public entertainment. Qinhuai Lantern has been inherited for more than 1700 years. The reason why Qinhuai Lantern still exists today is that it has remained as the props, the "objects" behind "Things" through 1700 years. Although "Things" are different in different dynasties and generations, it still inherits as a national cultural custom in modern society. Therefore, the study of Qinhuai Lantern can not be confined to its own research as "Objects". Instead, it should be jumped out of micro-cognition. The evolution of content of "Things" should be explored, especially the new expansion of today. What role does Qinhuai Lantern play in Lantern Festival?

The Lantern Festival usually refers to the "beautiful evening" of the first full moon in the Lunar New Year. The important custom in ancient Chinese agricultural society was to pray for the harvest for the farmers at the beginning of the spring, which was normally accompanied by a series of sacrificial ceremonies. One typical sacrificial ceremony was the fire-burning to inform the Chinese Gods. The behavior behind this is to light a fire or torch. The purpose of this behavior is to communicate with the Gods through the lights. The result of this behavior leads to a spring carnival. By the time of Emperor Wu of Han Dynasty, the previous behavior developed into another function: the decoration with lanterns. And the purpose combined the "communication with Chinese Gods" with the "entertainment with Chinese Gods". So, the "Things" behind Qinhuai Lantern have two meanings: blessing and entertainment. The content of blessing could be good weather for the harvest or harmony and happiness in the new year. For example, people in Nanjing in old times will send lanterns to their newly married daughters during the Lantern Festival. Because part of the Chinese character in Lantern means "person", which indicates the incoming of the children. Sending a lantern literally refers to "adding" a new family member. The content of entertainment is to anticipate the beauty of lantern during the Qinhuai Lantern Carnival. It can be concluded that Qinhuai Lantern is the "Objects" to enrich the experience of "Things" through Qinhuai Lantern Carnival: blessing and entertainment in the Lantern Festival.

Lotus Lantern (Figure 1), as one of the Qinhuaï Lantern, is no exception of the props of “blessing and entertainment”. Lotus Lantern originates from the lotus flower in Buddhist. It symbolizes the purity of religious world and indicates the successful result of self-cultivation in Buddhist. Lotus flower in Chinese culture meets the moral setting of “out of the mud without dyeing”. Through different generation of interpretation, the blessing content of Lotus Lantern has been conventionally accepted as the beautiful wish for women becoming as clean as ice and as pure as jade in morality, having many children and grandchildren in life, enjoying a happy marriage. The blessing content of Lotus Lantern has been objectified and represented in different parts of it (Figure 2). For example, the traditional Lotus Lantern is composed of main body, flower buds, pods and root. Most flower buds in Lotus Lantern are bright red, meaning harmony and happiness in life. Lotus pods in the lantern mean having many children and grandchildren. Lotus root in the lantern embodies the wishes of parents for their married daughters. As it is well-known, the lotus root snaps but its fibers stay joined. This phenomenon is used to indicate the meaning of “stay contacted” between parents and their married daughters. In ancient China, married daughters are regarded as the possessions of their husbands’ families. It is difficult for them to stay contact with their own parents. On the other hand, lotus root has several holes in shape. These holes inside a tube-like form can be seen as the route to the wealth. As described, the lotus root implies the parents’ best wish for their daughters’ life in their husband family. From the content of entertainment in Lotus Lantern, it is the only one in Qinhuaï Lantern Carnival that has not changed greatly in 1700 years. For example, only Lotus Lantern in Qinhuaï Lantern is still made of pasted paper. Lotus Lantern is the only one that can be seen every year in the carnival. The overlapping effect of Lotus Lantern can be seen as the core experience in Qinhuaï Lantern Carnival (Figure 3).



Figure 1. Lotus Lantern in Qinhuaï Lantern Carnival

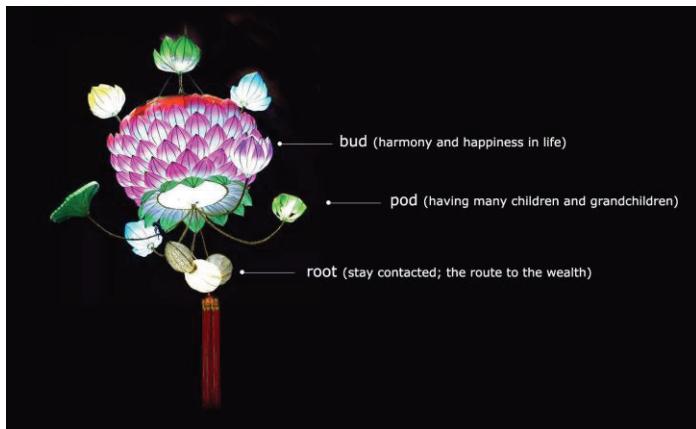


Figure 2. Meanings in different parts of Lotus Lantern



Figure 3. Overlapping Lotus Lantern in Qinghuai Lantern Carnival

Analysis on the dilemma of Lotus Lantern

Most royal lantern craftsmen in history were skilled craftsmen. With the popularity of the lantern in the public, ordinary people spontaneously trained themselves in making lanterns. Whether they had ever been supervised by royal lantern craftsmen, there was no recorded evidence. Later, they gradually evolved into a life supply mode based on family workshops. These group of people were called "lantern beggar" in old times. It can be inferred from the name that these group of people have very low social status. On one hand, they could not compare with skilled craftsmen in making royal lantern. On the other hand, they had little chance to receive the education of becoming the literati or scholar-bureaucrats. In one word, they could never be in the upper class. Therefore, the production of lantern is essentially a livelihood economy of self-supply to make a living. And the result of object creation behind this economy is to serve the ancient custom. There are limitations both in arts and culture. Those limitations are also reflected in lantern craftsmen nowadays. From the results of interviews(conducted in 2016-2018) which are organized by the author, most members in some famous lantern-making families have not

received any higher education. Before they are fully engaged in making lanterns, they are farmers, factory workers, doormen and so on. The way of making lanterns is inherited from generation to generation within blood-bond families through oral teaching and hand-to-hand practice. It can be seen that the improvement of skills in making lantern has been seriously hindered. It not only blocks the communication among lantern-making families, but also impedes the communication across the regional boundaries. In addition, since lantern making is a self-supply life mode to make a living, it is not regarded as the main means to earn the money. If the next generation in a lantern-making family is not interested or is unwilling to inherit and learn the skills, and it is almost unprofitable to sell the lanterns if the cost and the earnings are calculated. The shrinking and dying out of the skill inheritance will occur.

The traditional way of making a Lotus Lantern includes dozens of steps, such as blanking, shelving, dyeing, forming, pasting, hooping, decorating etc. It integrates paper-cutting, painting, dyeing, pasting, mosaic and other traditional skills (Figure 4). It has a long production cycle and needs larger space for production. In modern times, mechanized manufacturing has taken the place of part of the steps. The efficiency of the work has been improved to a certain extent, but the lantern craftsmen have lost their dominant in production. The uncertainty brought by handcrafting and the integration of craftsmen's personalities are eliminated, especially the emotions of the craftsmen can not be reflected in the process of the production. So, the handicraft of lantern-making should not be neglected in a short term. To the most interviewees, how to maintain the advantages of manual production and at the same time improve the efficiency of production is a problem to be solved. Considering the needs of people nowadays, this problem is not generated from a user's perspective. All in all, how to make the connection between Lotus Lantern and the end users is the problem that really matters.



Figure 4. Different steps of making Lotus Lantern

Therefore, the dilemma faced by Lotus Lantern is essentially due to the fact that the logic of "Things" and "Objects" behind it has not been fully established for

today's life. The main stakeholder in this service---the craftsman of lantern is unable to better adapt to market changes. They still limit the value of Lotus Lantern in its old paradigm and has not rebuild it today. The "Things" behind Lotus Lantern: blessing and entertainment, are limited by the time and space in specific period: The Lantern Festival. They have no connection with people's daily life nowadays. Even if the blessing and entertainment are also the needs of people nowadays, the way to realize them could not only be lighting a lantern. And for the Lotus Lantern, people can expand its space and time in usage, providing more practical choices for daily life. What's more, Qinhui Lantern Carnival has become indispensable local celebration of the Lantern Festival in Nanjing. As the protagonist of Qinhui Lantern Carnival, Lotus Lantern is not only the intangible cultural heritage in the world, but also an important part of local entertainment in Nanjing city. So, the development of Lotus Lantern is imperative. The various tools, materials, practical experiences, skills in manual production should be maintained. And the main stakeholder---the craftsmen of lantern should have their successors with or without blood bond. What's the most important, the logic of "Things" and "Objects" in the case of Lotus Lantern should be rebuilt. The research attention on the craftsmen of lantern should shift to the attention on building new relationships among different stakeholders. For example, can the end users experience the process of making a Lotus Lantern? Can they add their own emotions during the process? Can all the stakeholders be gathered together to find out the meaning of Qinhui Lantern Carnival? Service design thinking might answer these questions.

Introduction of service design thinking to Lotus Lantern

Design deliveries, as well as design itself, are basically consistent with the development of macro-society and economy. Service design comes into being with the arrival of post-industrial society. The main economic form of post-industrial society is service economy. Design based on service economy is service design. It extends from tangible product design to intangible product design, which includes services creating experiences and emotions. Service design can be regarded as "design for services" (Anna Meroni & Daniela Sangiorgi 2011). "Service" is the application of knowledge and skills for the sake of certain interests. It is an activity or a series of activities, the process of service providers implementing and satisfying the needs or interests of a particular group by using a series of management means. It is a contractual relationship between service providers and service users, which can encourage them to create values for the same targets. Service is a system and "Things". In order to make "Things" happen, meet the interests of all parties, to obtain certain value and experiences, it is necessary to design "Things" as well as "Objects". All parties (stakeholders) interact in the system of tangible and intangible design.

It can be seen that service design thinking (Marc Stickdorn,2011) includes the following characteristics: Firstly, service design thinking is systematic. This feature makes it possible to analyze the whole project from a holistic view, build the system of "Things" and "Objects" to meet the needs of stakeholders. For example, as shown in Figure 5, if the Lotus Lantern is put into a system of "Things" and "Objects", the expanded design goal could be found out. The goal of design should be focused on participation, sharing and entertainment.

participation, sharing, entertainment

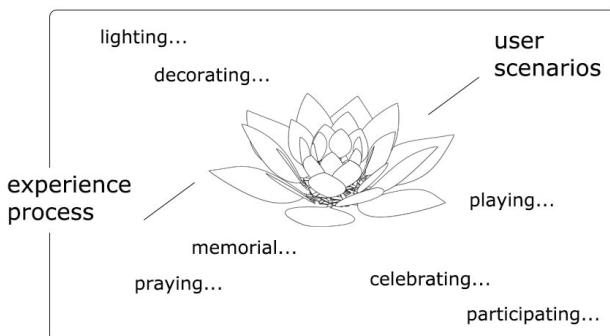


Figure 5. Redesign of “Things” in Lotus Lantern

Secondly, service design thinking has the characteristics of “co-creation” (Marc Stickdorn, 2011). This is an important feature which differs service design from other designs. Other designs, such as product design, basically carry out around the end users. But service design must serve not only the end users, but also other stakeholders. Therefore, the whole process of service design is not solely responsible by the designer, but by different stakeholders. Then, in Lotus Lantern case, the final design result is not presupposed by the designer, but completed together with other stakeholders, especially end users. At least, Lotus Lantern should serve as the prop for realizing the interaction between designers and end users.

Finally, service design thinking has the characteristics of experience. The content of service design includes the creation of experience and emotional reactions stimulated by it. Experience is formed on the basis of interaction between users and touchpoints. Users participate in the whole service system by the stimulation of touchpoints. The result of interaction between users and touchpoints will leave impressions in users’ mind. The gathering of these impressions will associate with the existing memories in users’ mind. It will form new meanings and impressions. It will also sublimate the original impressions of users. All in all, it can make unforgettable memories. In this case, the touchpoints are the Lotus Lantern and its user scenarios.

In conclusion, the result as shown in Figure 6 can be obtained if service design thinking is introduced to Lotus Lantern. At the top of the pyramid is the strategic layer, which can guide the whole design process. For example, in order to achieve the design goal of focusing on participation, sharing and entertainment, the Lotus Lantern as a touchpoint can be designed in a modular way. The system layer is in the middle of the pyramid, that is, the building of product service system. In this case, it could be composed of Lotus Lantern itself, user scenarios, customer journey and other elements in the system. At the bottom of the

pyramid is the touchpoint layer. Touchpoint could be seen as the carrier or prop of the services. In this case, the most important touchpoint is the Lotus Lantern.

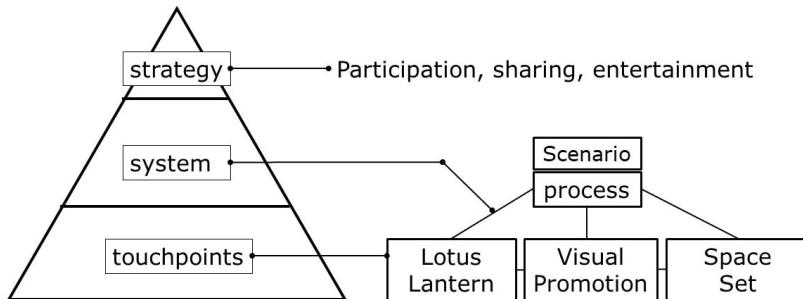


Figure 6. Redesign of “Objects” in Lotus Lantern

Design deliveries

From figure 5 and 6, it can be seen that the logic of “Things” and “Objects” behind Lotus Lantern nowadays is actually opposite to that in old times. Lotus Lantern as “Objects” is regarded as the reflection of different “Things” (blessing and entertainment) in different dynasties and periods (see table 1). But the new logic as well as the new relationship among different stakeholders of Lotus Lantern changes the role of “Objects” into the dominant experience toolkit to make “Things”. So, the key task for the design job in this case is to design the touchpoints with experience functions. The following design deliveries reflect a redesign experiment carried out by the author to test the introduction of service design thinking to redesign the historical Lotus Lantern.

Redesign of Lotus Lantern

According to the previous discussion, the redesign of Lotus Lantern in this case needs to be modularized for end users, providing them with scenarios to make it. This strategy can help to promote the interaction between the designer and the end user. Consequently, Lotus Lantern can be mass-produced in daily life. At the same time, this strategy can help to realize the goal of participation, sharing and entertainment. The key point in this design will be the modular structure of the main body of Lotus Lantern. As far as the traditional Lotus Lantern is concerned, the hemispherical skeleton is the main body. On this skeleton, forming, pasting, adding the buds and pods of the Lotus Lantern are carried out. Figure 7 and 8 have shown the process of the experiment to find the right structure as the main body of the skeleton. It can be seen that the deformable mechanism and origami structure are excluded in the process, the modular structure composed of the frame with radian joints has been confirmed in the first round of experiment.



Figure 7. The exploration of the skeleton in Lotus Lantern



Figure 8. The first round of the modular structure design in Lotus Lantern

However, in the testing process, this structure (Figure 8) cannot realize the design strategy. It takes a long time for the end users to assemble the lantern. In the meanwhile, although this structure is basically consistent with the hemispherical shape of traditional Lotus Lantern, the volume of the joint is too large visually. Also, the structure is easy to be fallen into parts when carrying a certain amount of weight. What's more, it is difficult to adding buds and pods of the Lotus on the surface of the structure. Traditional pasting methods have to be applied and that is time-consuming.

The next process focuses on improving the efficiency of the assembly way by the modular structure design. At the same time, the new structure should have the characteristics of traditional Lotus Lantern in appearance. Figure 9 and Figure 10 show the second round of experiment, and Figure 11 is the final modular structure.



Figure 9. The exploration of the modular structure design in Lotus Lantern



Figure 10. The exploration of the modular structure design in Lotus Lantern



Figure 11. The final modular structure design in Lotus Lantern

Design of the experience process

As shown in Figure 12, the experience process is designed to be participatory. The end users can choose different packages to make different Lotus Lantern in different sizes and complexity. The way of easy and quick production of Lotus Lantern is putting several modular joints together.



Figure 12. The experience process of making the Lotus Lantern

Design of the user scenario

As shown in Figure 13, the user scenario is actually a product service system based on experiences within the space set. On one hand, the end users can read stories and references about Lotus Lantern displayed on the wall. On the other hand, they can feel the pleasure of creation through personal experience of making the Lotus Lantern. And this space set can be easily applied to the Qinhuaï Lantern Carnival.



Figure 13. The scenario of making the Lotus Lantern

Conclusion

This case is a redesign exploration of traditional intangible cultural product---Lotus Lantern. Different from the common way of redesign the object itself, this case attempts to incorporate the existing objects into today's narrative context by applying service design thinking as well as the finding of the logic of "Things"

and “Objects” in the development of Lotus Lantern. It can be seen from the above that an incremental innovation has been created, which is quite different from the Lotus Lantern in the past. This kind of redesign combines the art of service design and promotes the interaction among different parties.

However, considering on the whole process of redesign, the standard process of service design has not been fully applied. It can only be regarded as an attempt to combine service design with product design. Or it can be regarded as an attempt to redesign the logic of “Things” and “Objects” in a Chinese way. Firstly, stakeholders have not been thoroughly implemented at different steps of design. They, especially the end users, play a role as testing targets. The co-creation of service design has not been completely executed. Secondly, designer itself has actually paid more attention in redesigning the tangibles than design of the intangibles. Finally, the content of experience is designed too much relying on the tangibles. For example, how to keep up with the latest design trends in information age has not been involved in, such as building a platform for Lotus Lantern. Although there is much regret in this case, it is still proved to be a valuable redesign experiment. This experiment can provide useful and practical references for the lantern craftsmen, lighting them up in designing lanterns much closer to daily life.

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Empathy for resilience

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Abstract

The essay stresses the potential value of empathy in designing strategies for resilience. We question the traditional idea of empathy as an individual skill addressed to understand the other, in support of a conceptualization closer to the phenomenological interpretation, focused on the relational dynamics at stake in human encounters. The paper reconsiders empathy as an experience valuable for strengthening a resilient attitude within collaborative projects. A case study will be featured, i.e. *Design in The Middle*, an ongoing project that gathers designers, architects and social activists from the Middle East/Euro-Med regions with the aim of generating design proposals to address challenges relevant to the Middle East. As participants come from very different cultural, political and religious backgrounds, their cooperation is a central and critical issue, which might benefit from contextual and relational “rules” enabling empathic experiences. In the context of the first *Design in The Middle* workshop (2017), some strategies have proven to be crucial in enabling effective communication over complex design issues. These strategies will be analysed according to a methodology developed in a previous research carried out by the author(s) (Devecchi, 2018) about the role of empathy in collaborative processes. Assuming that a resilient society preserves and supports cultural diversity, *Design in the Middle* stands as an example of collaborative design practice aimed at creating a more resilient future for these regions in which the coexistence of diverse cultural, religious and political positions is a substantial matter of concern.

Author keywords

Empathy; collaborative practices; social resilience; design methodologies.

Introduction

“Even twins have different fingerprints”, states one of the participants in *Design in the Middle #01 Workshop* when asked to relate his/her experience of the project to empathy (Interview by the author, May-June 2017). He or she – the survey was anonymised – believes that the multiplicity of cultural, social, religious backgrounds brought by the attendees – in other words, their diversity – added value to the experience and to the project’s outcomes, since it was a basic condition for empathy to flow. *Design in the Middle* is an ongoing project involving designers, who live or come from the Middle East/Euro-Med region, in co-imagining new “forms of governance, coexistence, ownership and alliances” [Designinthemiddle.org]. In this essay, we discuss the project as an example of collaborative practice aimed at building more resilient behaviours by increasing the empathic experience among participants.

Research stresses the potential of cultural activities engaging people in collaborative practices focused on weaving or re-sewing a fragile social fabric and thus enhancing social resilience (Arvanitakis, 2014; Manzini & Thorpe, 2018; Manzini & Till, 2015; Meroni, 2008). Moreover, scholars have underlined the role of empathy in promoting cooperation (Devecchi, 2018; Mattelmäki, 2018; Sennett, 2012). Therefore, the three threads of empathy, cooperation and resilience seem to be somehow interwoven. This study aims at unravelling the relation between them, as relevant to the design discourse, and follows a prior research on the concept of empathy, its complexity as a relational human experience, and its crucial role in collaborative design processes (Devecchi & Guerrini, 2017; Devecchi, 2018). Far from being exhaustively depicted as a social skill allowing one to identify with someone else, share his/her concerns and take his/her perspective, empathy has more to do with acknowledging the irreducible differences characterising each one of us and the way we deal with diversity. According to recent studies on phenomenology and ethics (Boella, 2018a, 2018b; Zahavi, 2014), the lived experience of empathy contributes to including the existence of the other in one's own personal horizon. The acknowledgment of otherness and “unlikeliness” (Eggebert, 2018) lays the foundation for meaningful relationships. Dealing with different and not-previously-known cultural identities may be highly challenging. It requires the capacity of negotiating and reshaping our own identity within each encounter. Collaborative design processes play a crucial role in rehearsing this continuous negotiation, opening ourselves to change and adaptation. In this respect, collaborative design practices may contribute to building cultural resilience, basically the ability of adapting our sense of self when challenged by the other breaking in.

The challenging nature of resilience

In the last decades, resilience has proven to be a highly multidisciplinary concept suitable to the tasks of many scientific fields dealing, from different perspectives, with risks analysis, such as urban and rural ecology, social engineering, developmental psychology, micro- and macro-economy, organizational management, and policy making (Ponis & Koronis, 2012; Wilson & Arvanitakis, 2013). The scrutiny of the huge amount of literature available on

the subject largely exceeds the task of this short essay. However, tracing the path back to the origin of the notion of resilience, and focusing on some key-concepts, may help understanding the reasons of such a success.

In the domain of Material Science, where it first appears, resilience is the power of a material of resuming an original shape after a stress such as compression, bending etc. Mechanics can measure this power as the energy per volume absorbed by a material when it is subjected to strain (OED, 2010). In other words, (mechanical) resilience is the capacity of “bouncing back”, after strain.

In the 1970s, the concept became part of the behavioural scientists’ vocabulary. Psychologists, in particular, defined as resilience the positive adaptation within a context of significant adversity. The notion originally focused on the individual capabilities – in early studies, Werner and Smith (1977) talked about “vulnerable but invincible” children, who thrive despite high-risk status: parental mental illness, maltreatment, poverty and community violence (Garmezy, 1974; Werner, Bierman & French, 1971). After substantial scrutiny and discussion, (psychological) resilience has progressively grown in complexity, and now refers to a dynamic process mutually involving the subject and the context (Luthar, Cicchetti & Becker, 2000).

Similarly, in Ecology, early definitions of resilience focused on the “ability to absorb change and disturbance and still maintain the same relationships between populations and state variables” (Holling, 1973, p.14). In this disciplinary context, too, resilience can be measured by calculating the magnitude of disturbance that a system could tolerate and still move forward (Carpenter et al., 2001). Further studies lead to a more comprehensive definition of (ecological) resilience, which stresses the interactive and dynamic nature of phenomena involved. In this new perspective, “resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedback” (Walker, Holling, Carpenter & Kinzig, 2004, p.5).

In extending its fields of application, resilience also changed in nature. From a Political Science perspective, David Chandler (2014) makes a distinction between “classical” and “post-classical” resilience, which may be useful for understanding this transformation. “The intimate logical roots of classical understandings of resilience are framed in terms of the inner resources and capacities of the autonomous individual”. There is “a strong subject/object divide”, between the subject’s internal capacity and the “pressures or stresses [that are] understood to be externally generated” (Chandler, 2014, p.6). In this respect, resilience is implicitly linked to the classical modern thinking. Whereas, in the post-classical framing, resilience becomes “an emergent and adaptive process of subject/object interrelations”, as it deals more and more with dynamic and nonlinear systems. “We increasingly understand adaptation to the world as being inseparable from the world in which we adapt” (Chandler, 2014, p.7).

Therefore, subject and context are interwoven, and resilience is not merely a matter of adaptation of the former to the latter, rather, it delineates a mutual interchange. The way we read this interchange affects the way we address

resilience-related phenomena. In the domain of Social Geography, Keck and Sakdapolrak (2013) delve in this direction. After substantial analytical work, they focus on the principles underlying the concept of resilience, which, according to their interpretation, "can be defined [...] as a system's capacity to persist in its current state of functioning while facing disturbance and change, to adapt to future challenges, and to transform in ways that enhance its functioning [italics in the text]" (Keck & Sakdapolrak, 2013, p.8). These features – particularly the last one (transformation) – help the authors reshape the meaning of resilience in social contexts (social resilience), a fundamental point of view for the purposes of this essay, as it adopts an "actor-oriented perspective", that is, a reading of resilience as a tool for fostering collaborative social transformation practices.

Keck and Sakdapolrak acknowledge that social resilience is still "a concept in the making", and its effectiveness accordingly requires further scrutiny. However, a trajectory can be traced: "from its initial meaning, referring simply to actors' capacity to respond, [it has] enlarged to encompass actors' capacity to learn and adapt; [and] now the concept also includes their capacity to participate in governance processes and to transform societal structures themselves" (Keck & Sakdapolrak, 2013, p.13).

This short inquiry on the notion of resilience provides us with some hints. Progressively, problems addressed have enlarged in scale and changed in nature: from molecular mechanisms to individual behaviours to environmental and societal interactions. In all these contexts, resilience has proven to be a vital conceptual tool for augmenting the understanding of the material world, of human beings, of communities and the environment, for it is strongly linked with two fundamental contemporary conditions: risk and change (Beck, 1992; Walker & Salt, 2006). These crucial issues, we cannot expand on within this essay, lay, however, in the background as key-components framing the concept of resilience. In fact, the notion itself increases its relevance in parallel to the growing concern with societal risks and social-ecological systems change – the "adversities", we may say. The focus shifts from subject-oriented to subject/context-oriented, and the relationship between the two evolves accordingly: from adapting to steady conditions to interacting with dynamic ones.

This trajectory, however, is under dispute. There is a large consensus among scholars about the systemic nature of most resilience-related problems. More questionable is whether resilience contributes to solve them by adaptation or by transformation. In this respect, the concept proves to be a litmus test between those who prioritize the external – or context-related – factors of change and those who champion an active role of both individuals and communities in facing them. In this respect, the issue of *how* to enhance resilience is crucial.

For the purpose of this essay we adopt a collaborative perspective such as the one embedded in the concept of social resilience, assuming that cooperation can act as a bridge between the two parallel goals of enhancing the resilience of and promoting empathy among individuals and communities.

The lived experience of empathy

In recent years, empathy has become an “umbrella term covering a number of different experiences” (Boella, 2018b, p.2), its meaning remains superficial as long as summarised in the popular metaphor of *putting yourself in someone else’s shoes*. Significantly, as for the word itself, the philosopher Laura Boella claims the need to switch from the singular to the plural form. *Empathies*, in her view, more correctly captures this multifaceted phenomenon dealing with complex stratified experiences that occur when individuals have any encounter whatsoever (Boella, 2018a).

Shortcomings of the conceptualization of empathy exist in all fields, including the design discourse. Design researchers and practitioners recently began to perceive the inadequacy of the traditional empathic design approach, developed for a designer-user-product/service relation that substantially changed over time (Devecchi, 2018; Mattelmäki, 2018; Battarbee et al., 2014; Cipolla & Bartolo, 2014; Manzini & Till, 2015; Mattelmäki et al., 2014; Sustar & Mattelmäki, 2017). Especially in the emerging collaborative approach to design, the role of human relationship is acknowledged as crucial. Since co-design has gained momentum, designers are no longer asked to merely understand their users; rather, they are themselves involved in a process in which everyone – expert or non-expert – plays a role in achieving a common goal (Sanders & Stappers, 2008; Manzini, 2015). Empathy as a skill, even though acquired with specific techniques, ultimately falls short of the demand for establishing a truly dialogic exchange aimed at encouraging cooperation among multiple actors (Meroni & Sangiorgi, 2011; Cipolla & Manzini, 2009).

The discourse on empathy has recently taken two main directions: on the one hand, the neuroscientific research about the *mirror neurons system* as the bio-physiological root of the empathic behaviour (Gallese, 2001; Gallagher, 2012); on the other, the re-emergence and revision of the phenomenological heritage on empathy dating back to Edmund Husserl, Max Scheler and Edith Stein by scholars like Dan Zahavi (2014) and Laura Boella (2018a, 2018b). The latter direction is relevant to our argument, since it explores the experiential dimension of the empathic act as a phenomenon occurring in the context of relational encounters. From this perspective, empathy becomes a phenomenon involving subjects experiencing each other, rather than a feeling, an emotion, or – more importantly – a skill of understanding the other via identification. Zahavi argues that empathy is a kind of “knowledge by acquaintance” (2014, p.151), for others are identified as irreducibly others, and acknowledged in their own terms. Consequently, the empathic act, intentional and immediate, discloses the existence of the other in our personal horizon, independently from any attribution of feeling, thought or desire driving his/her comprehension. In other words, empathy’s “primary focus is not what we have in common with others, but how we experience the existence of others who are different from us” (Boella, 2018b, p.5). Such a tenet “allows us to exclude a notion of empathy as an individual mental or affective state, in order to insist on its nature as a phenomenon that depends on the relations between two subjects and their specific contents” (Boella, 2018b, p.7). Key to this perspective is the concept of interdependence between humans, for we are mutually involved in building knowledge of ourselves and of the world around us.

Empathic experience, collaborative practices and resilience

With regard to design, the perspective on empathy explained above substantially puts aside the techniques for empathising that help designers know better who they are designing for, such as design probes, personas, role playing, etc. These empathic design methods achieve full efficacy as long as designers play a demiurgic role, in a process relying on the way he/she individually relates to users. Assuming that design practices bring people together through cooperation and co-designing (Gunn & Donovan 2012; Manzini, 2015), the relationships at stake involve all participants, designers included. In this context, empathic design tools should support strategies for enabling a kind of relational experience that – capitalising on diversity rather than commonalities – promotes a dialogic exchange among individuals. Richard Sennett (2012) argues that empathy relates to dialogic exchanges, since it – differently from sympathy that conveys identification – opens up to differences and discloses curiosity about people for who they are, on their own terms, forcing us to focus beyond ourselves. The term dialogic, unlike dialectic, concerns “a discussion which does not resolve itself by finding common ground. Though no shared agreements may be reached, through the process of exchange people may become aware of their own views and expand their understanding of one another” (Sennett, 2012, p.19). Assuming that empathy supports dialogic skills by bringing mutual knowledge about, and that dialogic skills lay the groundwork for cooperation, enabling empathic experiences may contribute to enabling collaboration.

Developing *enabling solutions and systems* (Manzini, 2015) is a fundamental issue in the broad discourse of design for social change, particularly when dealing with *creative communities* (Meroni, 2011) engaged in collaborative activities. Within this context, the project Cultures of Resilience (CoR), held at the University of the Arts London (UAL) between 2014 and 2016, featured a set of art and design research actions “weaving people and places”, with the aim of building socially resilient communities. Participatory art and design activities carried out within the framework of the CoR project have been created as opportunities for collaborative encounters between people who would not normally meet, so to establish new unforeseen relationships. In this respect, cooperating towards a common goal in a context that encourages dialogue, embodied engagement and meaningful relationships, contributes to build *communities-in-place*. “Social resilience requires the existence of groups of people who interact and collaborate in a physical context. Proximity and relationship with a place are what enable these people to self-organize and solve problems in a crisis” (Manzini & Thorpe, 2018, p.1). From this viewpoint, collaborative art and design processes provide the context for questioning our own identity and developing self-awareness through the exploration of atypical relationships. By testing our capacity of adapting to and negotiating with diversity, we can respond better to “discrepancy and dissemblance” (Rancière, 2009, p.7) generated by the unexpected encounter with the “unlikeliness of us” (Eggebert, 2018). Carla Cipolla (2018) stresses the need to intentionally enable vulnerability in collaborative practices. In her view, vulnerability is deeply connected to meaningful relationships for they must rely upon mutual exposure to one another’s presence. Being vulnerable means being open to the risk of meeting unknown persons and being able to establish with them a dialogue that reshapes your own identity.

Therefore, risk and change are inherent to resilience, also when it involves cultural identity and social relations. Collaborative practices prove to be effective ways to test resilient behaviours. Together with vulnerability, the lived experience of empathy push and nurture dialogic exchange and meaningful encounters, where differences are a value asset. Dialogues and relationships *per se*, of course, cannot be designed. However, both vulnerability and empathy can be enabled by “conceiving, assembling, and enhancing dedicated sets of actors, assets and artefacts” (Manzini & Thorpe, 2018, p.8) and by setting out favourable contextual conditions.

Design in the Middle. Where empathy, collaboration and resilience meet

In March 2017, 30 designers and architects from the Middle East/Euro-Med region gathered at the National Museum for the XXI Century Arts in Rome (MAXXI). They were invited to participate in the #01 Workshop of *Design in the Middle*, an ongoing project aimed at co-designing possible responses to challenging issues relevant to the Middle East, such as borders, religious diversity, migration, water and food resources, information mobility and cultural exchange (Perez & Tarazi, 2017). The project was curated by Maria Alicata, Merav Perez and Ezri Tarazi, and supported by Baruchello and Mondo Digitale Foundations. Participants had never met before, and had different links to the Middle East. Someone had fled years ago, someone had just left for studying or working, someone else still lived there. Clustered in five transdisciplinary groups, they worked around distinct – yet connected – critical topics for one week: *Nomadentity*, focused on challenges related to immigration, open borders, self-dignity and identity; *Core.ligious*, dealt with freedom of belief, awareness of personal spiritualism and faith; *Lost in translation* explored communication, cultural exchanges and e-learning; *Digital dunes* was about data harvesting, mining and ensuring; *Food print* delved into water and food rights and resources, new agriculture and new energy supplies. “The goals of the workshop were multiple: to ignite and rehabilitate the fragile civic imagination of participants through the conception of alternative near-future scenarios, while eliciting a wide range of design proposals, from the imaginary to the applicable” (Perez & Tarazi, 2017, p.S4308).

The Guido Reni room, usually a conference room, has been temporary unsettled for the purpose of the workshop. It was divided into two areas: a “pop up studio” equipped with tall yellow elements on wheels that created intimate working corners, and a public space for discussion and presentation. In this environment, especially conceived for encouraging dialogue and discussion, in smaller and larger groups alternatively, participants met after a month of preparatory work supported by a collaborative online platform. In Rome, they worked in teams achieving multiple results that were discussed within an open studio event with a panel including scholars and practitioners engaged in the issues at stake in the workshop. Curators claimed success for the initiative and considered it a highly meaningful opportunity for thinking and imagining beyond borders.

Three main reasons suggest an investigation into the case study of *Design in the Middle*: the workshop promotes a collaborative design practice; it elicits empathic experiences among participants, making room for meaningful dialogic encounters; it effectively builds social resilience in a conflict area. In this

respect, we may say that the workshop encompasses the three threads of cooperation, empathy and resilience, showing their reciprocity. Looking closer into the case study, we can recognize a number of *enablers* that contributed to the successful outcome of the project. Drawing upon a campaign of interviews with some of the participants run by the author(s) between May and June 2017, we can assess the efficacy of the *enablers* in achieving empathy, fostering collaboration and – ultimately – building resilience. The list of *enablers* takes up some of the insights of the CoR project, and partially overlaps with author(s)' previous studies (Devecchi, 2018; Devecchi & Guerrini, 2017). The latter achieved the identification of 4 contextual and 5 relational *enablers* of the empathic experience by investigating six case studies of participatory art practices. A contextual enabler pinpoints "an external condition, independent from participants' attendance at the event, installation, workshop or activity. It relates to the general circumstances set up to characterise the space and the time for the event to happen. [...] By relational enabler we mean a condition determined by making people involved interact in a particular way. Relational enablers concern the rules of interaction set up in the context of each case" (Devecchi, 2018, p.117-122). The research came out with merging the 9 *enablers* into a set of guidelines for designing the empathic experience in collaborative contexts.

As regards *Design in the Middle*, we must say that not all the *enabling strategies* featured below have been consciously designed by the organisers, although particular attention has been paid to the workshop setting.

- *Design in the Middle* has been hosted in a museum, an institution that, by its very nature, preserves cultural identity. Curators considered MAXXI appropriate for gathering people from different conflict areas, as it was an extra-territorial place, neutral and safe. Participants particularly appreciated working inside a museum in Italy, a place rich in history and culture they felt as a kind of "de-risked" environment (Interview by the author, May-June 2017). This enabling condition matches the author(s)' guideline *Safe Zone*, which suggests choosing locations "that conveys neutrality, safeness and freedom of thought" (Devecchi, 2018, p.153).
- The Guido Reni room was temporarily changed into a cosy studio environment, where it was easy to switch from small group work to shared dialogue and discussion. The tall yellow elements on wheels provided a dynamic and informal context that conveyed an open-minded attitude. With regard to the CoR project, Manzini and Thorpe (2018) claim the importance of triggering artifacts for enabling meaningful encounters. We may interpret these yellow elements "that referenced desert tents" (Perez & Tarazi, 2017, p. S4315) as triggering artefacts.
- The list of participants was drawn up accurately. The final group included "junior and seniors designers and architects from all over the Middle East/Euro-Med Region, students and designers from the Middle East who were studying or working in Europe, and a few European social designers and entrepreneurs who were actively involved with the issues at stake" (Perez & Tarazi, 2017, p.S4314). The resulting blend of perspectives, due to different

background, degree of education, life experiences, age and – especially – religious beliefs, could be potentially explosive. On the contrary, the workshop offered the opportunity for each and every voice to speak, building on diversity its most valuable outcomes. Equally concerned for their own countries, plagued by everlasting conflicts, participants discovered that their differences in opinion, expressed in a neutral context, could be a resource instead of a hindrance. Most of them referred to this specific experience as empathic (Interview by the author, May-June 2017). The choice of participants is an important issue also in the author(s)' research (Devecchi, 2018). The guideline *Embracing diversity* suggests we should select or cluster participants focusing on their differences (personal, cultural, professional) so to bring competition into collaborative processes.

- Organisers intentionally provided participants with little instructions. They considered that a detailed formulation was detrimental. As the task of the groups was itself to generate new design proposals, giving demanding briefs and setting key targets was inappropriate. Moreover, the titles of the clusters were attentively crafted to leave room for interpretation and critical thinking. The selected keywords (*Nomadentity*, *Lost in translation*, *Core.ligious*, *Food Print*, *Digital Dunes*) could provoke debate, and encourage the exploration of alternative perspectives with no specific outcome in mind. In this respect, participants were invited to stay "alert to the revelation of the unexpected" (Eggebert, 2018, p.13).
- Informal discussions, light encounters, opportunities for sitting all together and sharing personal life experiences were scheduled in the agenda of the workshop. The balance between highly demanding work and disengaged moments of exchange proved to be effective in building a cooperative attitude (Interview by the author, May-June 2017). Author(s)' corresponding guideline is *Never mind the clock*, which suggests how to plan a flexible schedule for collaborative activities (Devecchi, 2018).
- Perez and Tarazi reported that "most of the groups did not speak or think in terms of solving problems or developing objects. Rather, they focused on developing wide-ranging projects that tackle complex topics in a multi-dimensional approach" (2017, p.S4316). This recalls an observation by Manzini and Thorpe in the context of the CoR project about redundancy. They argue that many of the activities "appear to some extent superfluous – offering a positive redundancy – and hence capable of enabling participants to prototype and practice, to rehearse new ways of being together that may be drawn upon in future, more crucial contexts." (2018, p.7-8).
- Not all the strategies set up for the workshop were successful. Significantly, web-based activities proved to be mostly ineffective. One month before the workshop took place, a preparatory online session was launched, in order to provide a knowledge base for all participants. Compared to the energy, enthusiasm and success of the in-place activity, the remote preparatory work "did not prove itself as an effective collaborative tool" (Perez & Tarazi, 2017,

p.S4316). This failure confirms that collaborative practices are not suitable for the Internet, as they do not provide participants with the necessary environmental conditions for enhancing empathic experience. To use Sennett's words about online collaboration, "in undertaking cooperation, users are capable of handling more complexity than the programmers provided for" (Sennett, 2012, p.29). Until we learn how to teach computers to behave empathically – or we might say, unless we do – empathy will remain a human behaviour. In this respect, empathy works as an antidote to the Internet.

Conclusion

Design in the Middle provides some hints on the dynamic connection between three components of collaborative practices: space, people and activities. An accurate fine-tuning of the three aspects can enhance the transformative potential of a process and contribute to successful outcomes.

As regards space, we can say that collaborative practices are usually in-place activities (Manzini & Thorpe, 2018); designers and experts not always live in the place – more frequently come from elsewhere – and residents act as hosts. This situation may help conversations or not, depending on the conditions established among participants. However, a peer-to-peer cooperation can start between residents and experts as the former bring a first-hand knowledge of local problems and the latter the methodologies and skills required to cope with them. *Design in the Middle* provides participants with an extra-territorial space, a neutral, out-of-context environment where differences or hierarchies of any kind (personal, cultural, professional) – whether established or not – do not depend on the place. As in an in-vitro experiment, participants can focus on the issues at stake without any distraction – or inspiration – from a specific context. This reflection corroborates author(s)' *Safe zone* guideline (Devecchi, 2018), which in turn recalls the concept of "de-risked" environment crucial to CoR activities (Manzini & Thorpe, 2018).

As for people, we consider that participatory design, by definition, involves in a common practice people of different ages, cultures, types of knowledge, skills and interests. They bring into the discussion a variety of perspectives, which, both enrich and problematise any conversation. *Design in the Middle*, although introduced as a transdisciplinary work, gathered a selected group of 30 designers and architects. According to records, the list of participants was very diverse, as regards provenance, age and experience. The composition of the team, though, was far different from usual, for participants shared a common education and professional background. This condition does not necessarily encourage meaningful encounters: we all know how tough a conversation among peers – particularly designers – can be, each one defending his/her culture, experience and beliefs. However, this distinction from usual practice might have contributed to successful results. Author(s)' guideline *Embracing diversity* is partially confirmed by the analysis of the case study, for it stresses the importance of differences, albeit on the basis of a shared background.

In respect of activities, our previous studies focused on strategies enhancing interpersonal exchange rather than on methods applied in addressing issues at stake. Distinctive aspects of the design process, such as the shaping of the brief or the identification of goals to achieve, exceeded the perimeter of our research. Significantly, the scheduling of *Design in the middle* activities confirms our recommendation to balance workload between focused activity and open, informal conversations (*Never mind the clock*) conveying "the feeling that within that context time rules are different from the ordinary" (Devecchi, 2018, p.155).

At the same time, the workshop crafts the design process in ways that can boost empathic experience. In particular, we refer to low-detailed design briefs and to the "open" titles given to them. These two tactics no doubt not only stimulated imagination and speculative thinking, but also encouraged the free exploration of ideas and suggestions by whoever had them, thus promoting peer-to-peer conversation and cooperation. Even fixing the time horizon in three years (2020) might have contributed to success as it provided participants with a kind of "conceptual" risk-free zone, out of the constraints that current conditions impose for elaborating reliable solutions. In this respect, shaping the contents of collaborative design practices precisely to enable empathic experience seems to be a promising field of future investigation.

Boella argues that it is time to open up new horizons in empathy-related studies, in which empathy is not an idealised object of speculation. Rather, she suggests, understanding empathy requires a practical perspective, focused on "historical, cultural and social situations in which tuning into others' differences is difficult or rejected" (Boella, 2018b, p.10). Similarly, both the CoR project and Wilson and Arvanitakis' study (2013) focus on practices of resilience, i.e. activities that allow communities to weave a resilient social fabric, suitable for facing crisis and responding appropriately. From this perspective, we can argue that by enabling collaborative activities we provide opportunities for *empathy in practice*. "Empathy is crucial to fostering meaningful encounters between people" (Manzini & Thorpe, 2018, p.7), and communities are built on meaningful encounters. If we acknowledge that resilience requires "engagement in processes" (Arvanitakis, 2014, p.66) involving people within communities, and that enabling empathic experiences can strengthen cooperation among individuals, the development of tools geared to that becomes crucial. In this respect, this essay might have taken a step forward on a broader research path about how to capitalise on human relationships towards more resilient cultures and societies.

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Quoted interviews are stored in the author's Google Drive and freely accessible under request by mailing to: alice.devecchi@gmail.com

Social Innovation and Co-Creation through Design: utilising natural resources to facilitate sustainable development

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Abstract

The study and practice of design is deeply rooted in culture and tradition, establishing resilience through its proven methods and producing robustness in the continual development of knowledge and skills. This research explores the value of co-creative design methods within rural communities as a means to motivate and empower while contributing to new ways of thinking, doing, and understanding sustainability in design practice. Through observational studies, qualitative insights and participatory design methods, this research examines the challenges faced by the rural women of 'Gudiya Village' in Indore, India, where design skills are tested to promote sustainable development through use of natural building materials, resources and techniques. The main focus of the research expands on the role of co-creative practice in disrupting the hegemonic position of design, leading towards and promoting the fluidity in knowledge transfer and exchange. This paper provides a discussion of how design practice and knowledge are influenced by cultural traditions while, in turn, informing new perspectives for cultural production through the symbiotic relationship between designers and communities of practice. The role of design, to educate and empower, is presented as a framework for future designers, researchers and co-creators to embed cultural and sustainable practices as part of shifting resilience into robustness.

Author keywords

Women empowerment; co-creation; social innovation; sustainable development; natural building; community development.

Introduction

Issues of gender-based discrimination and inequality have led to new discourses on promoting women empowerment for future sociocultural development and progress across developed and developing societies. The role of women is brought to the forefront of this research, where their involvement and participation define new, meaningful roles toward achieving sustainable development within rural communities. Design methods, skills, and knowledge contribute to a co-designing process, through which, a group of rural women in Gudiya Village (Indore, India) are tasked with improving upon their living conditions and infrastructural problems. Utilising available natural resources, a combination of traditional and modern building skills and techniques are tested to motivate and encourage the involvement of women in the design processes of planning, decision-making and solution-finding.

This research evaluates the role of design in facilitating and equipping rural women with the skills of natural building, permaculture, and social design practices. The influence and impact of this study is measured by productivity and progress for rural societies in creating new values through social innovation. This paper examines and discusses the following:

1. Design Themes – *introduction to the importance of women empowerment, sustainable development and social innovation.*
2. Case-Study of Gudiya Village – *outline of the research methodology, process of co-creation, design prototyping and testing.*
3. Design for Social Innovation – *discussion on the flow of knowledge transference, development of communities of practice, and a model for social innovation through co-creative design.*

Design Themes

Women Empowerment

The limitations surrounding women in rural areas is a key focus of this research to heighten the awareness of the women from Gudiya Village towards the availability of resources, skills and knowledge as a means for economic independence. According to Shields (1995), the concept of women empowerment is developed by defining a sense of self, allowing identity to inform actions and decisions, and experiencing connections with other members of society. Enabling women to achieve new opportunities leads to the transformation of gender relations within families, empowering women to make decisions to affect their futures (Elborgh-Woytek, et al., 2013). This research examines how a process of awareness, capacity building and co-creation lead to the empowerment of women, furthering the discourse of design's role against the context of social issues.

Sustainable Development

Women empowerment and gender equality are important components of achieving sustainable development in society and culture. The ability of women to participate and co-create, by means of natural building and permaculture design practices, reinstates power to the women of this study to improve upon their living conditions while developing personal knowledge and skills.

Natural building is the sustainable practice of utilising primarily locally-sourced, minimally processed, natural materials. Permaculture design is an ecological design process that considers ethical and ecological principles to create positive change. The concept of sustainable development relies on natural building and permaculture design practices through economical solutions supporting continual development and improvement. The techniques and skills of earthen architecture are transferred and expanded upon through knowledge sharing in the designing of communal spaces.

Social Innovation

Social innovation can be broadly defined as interactions between people and communities to assume responsibility for positive and robust impact. According to Manzini (2015), designers now belong to a world in which everybody designs and this emphasises the importance of designers to provide more initiatives to better facilitate effective design. The role of designers, therefore, has shifted into a space that focuses on social needs, creates new social relationships, and fosters collaboration as a means for sustainability. This collectively contributes to designing societies that lead toward social change, redistributing influence and power by increasing capabilities and knowledge to allow new opportunities to emerge. Social innovation results in the formation of collaborative actions that, through co-creative design, lead toward visible improvements. However, the lasting impact of social innovation is not limited to tangible improvements but affects changes in attitudes, behaviours, and perceptions (Neumeier, 2011).

Case-Study of Gudiya Village

Background and Context

Gudiya Village is situated in the midst of agricultural fields, forests and jungles, without access to urban facilities such as proper roads, transport, stores, schools or hospitals. Descending from the "Jhabua" tribe, the people of the village have been forced to adopt a nomadic lifestyle without any legal rights to own land. This has forced the villagers to labour in nearby agricultural fields to repay debts incurred by previous generations and maintain a livelihood. The people of Gudiya Village live as one large family unit and have built a settlement of 15 houses, of which 10 are made from mud and 5 from brick, all built by the women. The women collaborate with one another to build and improve their village with naturally available resources. Each child is taught from the age of 4

to use mud, soil, bamboo sticks, wood, animal dung, and plants to produce shelters, furniture, utensils and medicine.

The men of Gudiya Village spend the majority of their time outside of the village, staying on the fields or in nearby cities, emphasising the important role of women in this rural community as primary caretakers and leaders. Their daily lives consist of maintaining the local village infrastructure, caring for the animals and children, working in the fields, etc. Although these rural women assume the majority of responsibilities for the village, this is not reflected in their position and status. The living conditions, comprising poor facilities and infrastructure, directly affect the health of the women and children. Poor cooking utilities, structural building issues and water facilities have led to severe health issues such as asthma, respiratory illness, infections, heart disease, spinal conditions, etc.

The women of the village are instrumental to the building and maintenance of their living quarters. They have shared and transferred, through the generations, the knowledge and skills necessary to build their homes with working stoves at the hearth of the family's shared spaces. Against the context of the village, one key area of focus was identified in ways to improve upon the cooking stove. The women have built biomass cooking stoves, which are heated by burning wood, charcoal animal dung or crop residue. Due to poor ventilation and the location of the stoves within each home, the design itself was seen as inconducive to the living environment. The premise of this research began with a design brief to improve the cooking stove with available natural resources, skills, and knowledge.

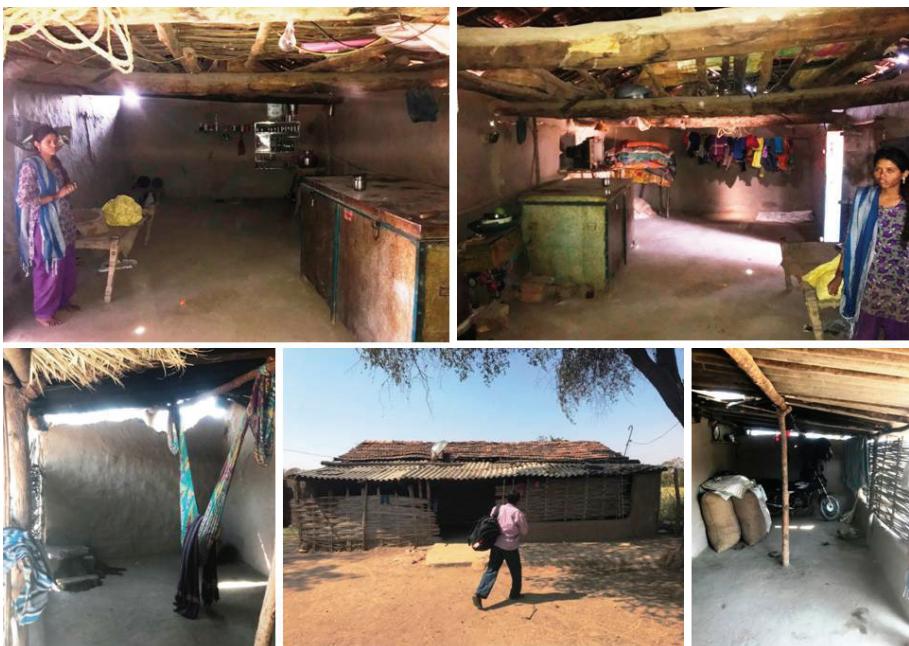


Figure 1. Living Conditions of Gudiya Village

Research Design and Methodology

This research focuses on the immersive role of the designer-researcher in facilitating a co-creative design process to allow an exchange of knowledge and skills. The main objective of the research was to test how co-creative design methods can introduce the skills of a product designer, interior-architect and cultural agent. Furthermore, it was anticipated that the co-creative process would further empower the women and equip them with design skills to continue developing and improving upon the needs of the village.

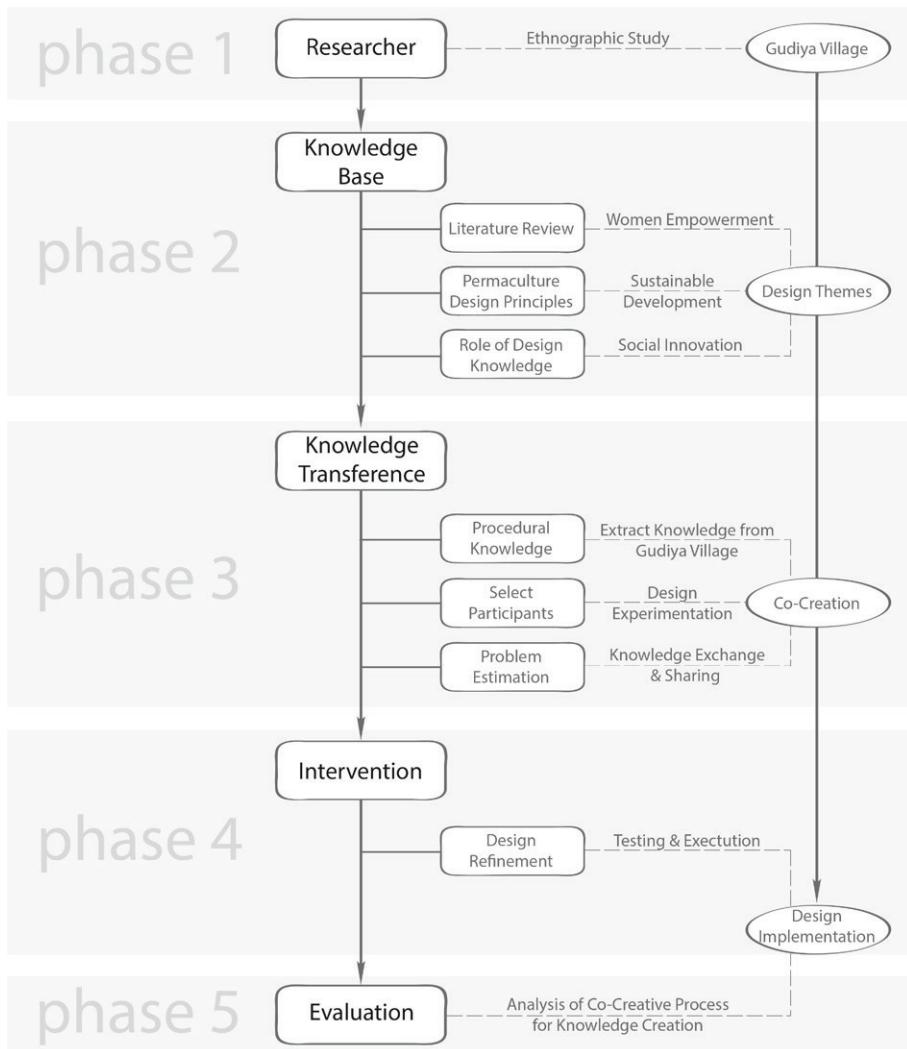


Figure 2. Research Design

The research methodology is structured into 5 phases to map out the context of study, understand the issues affecting the village, identify the key design themes, categorise the specific knowledge required for progress, develop a co-creation design process, and measure potential impact. Co-creation, as an important design process, is identified as being instrumental to future progress and development in Gudiya Village.

1. **PHASE 1** – Gudiya village was identified as the research site. The researcher was able to use ethnographic observations to document daily life activities, understand the environmental context, map the interactions between the women, identify significant objects of use, and clearly examine the immediate needs affecting the village.
2. **PHASE 2** – The literature signified the existing discourses on women empowerment and the role of design. This was identified as a key theme to anchor the research, as the primary inhabitants of the village are women. The researcher's professional knowledge, as an interior architect, was further cultivated by learning new skills in permaculture design. This knowledge led to the second theme of sustainable development, which focuses on the use of natural building materials. The role of the designer, in facilitating social development and change, increases the potential impact for knowledge to sustain cultural traditions while leading towards future progress. Social innovation, as the final theme, reifies the important role of designers to deeply engage in projects comprising design issues across sociocultural dimensions.
3. **PHASE 3** – Knowledge is produced when confronted by or shared with other forms of knowing and doing. This study acknowledges the activities of the women as following a design practice, as they go through the iterative processes of refining and improving their skills and knowledge. The practical know-how of the women, as a form of procedural knowledge that requires testing and evaluating, was extracted and examined. This set the premise for the co-creative process, where the researcher was able to learn from the women while transferring her specialist skills in the form of knowledge exchange.
4. **PHASE 4** – The experience of co-creation produced a design intervention, which not only affected the physical environment but became a site for further testing and refinement.
5. **PHASE 5** – This final phase of design implementation involves the evaluation of the finished object to monitor the quality of the design, observe the object in use, allow the women to further build on the design, and receive feedback.

Participatory design has always been advocated for by design practitioners and researchers, as design is a future-oriented activity and its end-use cannot always be predicted. Cross (1972) called for new approaches to design that involved citizen participation in decision making, as users need to understand the intentions of design to fully integrate its value. Co-creation, as a part of design practice, will change how designers design, what is being designed, and who is involved in the process of design (Sanders & Stappers, 2008). This research involves the active participation of co-creation as a trajectory for new innovations to arise and embolden the village women to continue building on their existing knowledge. A group of 7 female participants were included in this study – four housewives, two teenaged girls and one six year old child. The researcher was able to facilitate the co-creation process by first acknowledging the existing practices and knowledge, informing new ways of making through sustainable methods, and collectively designing an improved outcome.

This study integrates sustainable techniques by building with natural resources and reusing waste to promote a sustainable way of life. Materials were gathered to design and build an improved biomass cooking stove – sand, soil, grass fibres, brick powder, ash, and water. The process embedded the traditional techniques previously utilised by the women, injected the new skills taught by the researcher, and combined available natural resources to redesign and co-create a more efficient and effective outcome.



Figure 4. Co-creation between Designer and Village Women

During the evaluation stage of the research, it was apparent that the women had benefitted from the co-creative process. This established a new level of trust, allowing the researcher to further explore future opportunities to create more valuable solutions for the village. The new knowledge gained by the women equipped them with transferrable skills to understand the importance of identifying problems or issues, following a systematic process, testing and revising, and evaluating the solution.

Design for Social Innovation

Knowledge Transfer and Exchange

The role of knowledge is deeply rooted in this research, which acknowledges the positioning that reality is socially constructed through activities involving human knowledge to produce symbolic representations. Design, therefore, becomes significant as a form of communicating significant meanings. These meanings, embedded within finished designs, are representative of the values pertinent to a given culture. According to Friedman (2000), design practice shifts experiential learning into knowledge creation through a feedforward and feedback mechanism. Design produces its own knowledge across tacit and explicit dimensions to generate new ways of re-contextualising and transforming the built environment. Knowledge is necessary to transform thought into action, a precondition for selecting relevant knowledge to inform the decision-making process.

The women of Gudiya Village held a form of embodied knowing, in the ability to replicate and recreate various objects and forms. These skills represent informal knowledge, largely tacit in how it is used, that relies on perception and experience to establish tangible results. In this manner, the women have always been engaging in design-like processes that transform existing knowledge through practice to produce their own forms of design knowledge (Olsen & Heaton, 2010).

The researcher embarked on the co-creation design process by first decoding the existing knowledge of the women. This included their understanding of natural materials, the reuse of waste, and processes of testing to refine the finished objects. Design, in producing material and non-material culture, requires an understanding of social phenomena and utilises projective ability to predict future subject-object relationships within specific social contexts (Narvaez, 2000). The role of the researcher was to develop new knowledge upon an existing foundation and, in learning from the women, adapt and apply specialist knowledge to facilitate a collaborative learning experience.

The co-creation process allowed knowledge to be transmitted, shared and exchanged through a collective experience that reconciled the distance and power structures separating the boundary between “design as researcher” and “user as designer.” Knowledge was fluidly transferred through design experimentation, assigning ownership over the finished object to all involved stakeholders. The utility and function of the design produced new knowledge,

establishing robustness in its ability to change previous knowledge structures. This knowledge is represented by the improved cooking stove, embodying the intentions of the individuals and constituting new meanings in the forming of self-awareness (Csikszentmihalyi & Rochberg-Halton, 1981:104-106).

The knowledge resulting from the co-creation process is socially robust in the fluidity of its transference from the village women to researcher, researcher to women, women to other women, village to other village. Knowledge is gained from individual experience and perception, shared and communicated through processes of making, and represented in finished forms that embody intentions and symbolic meanings. Design objects establish meaningfulness through increased interactions, allowing knowledge to continually adapt and evolve as a part of progress. As the women of Gudiya village continue to explore their new knowledge, applying it to different problem areas, design is able to establish robustness.

Communities of Practice

Bottom-up social innovation is possible when problems affecting a community are posed by everyday life, where design-led processes can be introduced that apply skills and ways of thinking as part of design activities (Manzini, 2014). This allows an opportunity to design with communities, participating with community members to facilitate and foster collaboration. Active participation from the community challenges existing hegemonic structures to initiate the concept of democratised innovation, brought on by the relative ease of accessing information and means of production, to assign new roles and power to the involved stakeholders (Bjorgvinsson, et al., 2010). Co-creation, therefore, requires collective creativity to develop shared visions, ideas and solutions.

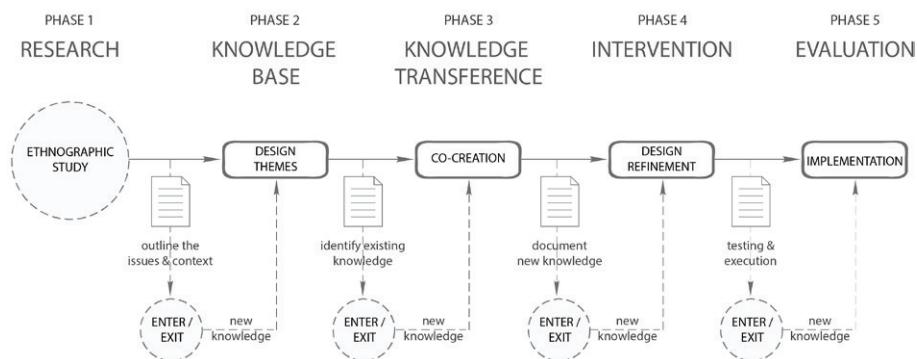


Figure 4. A Model for Social Innovation through Co-Creative Design

Social innovation, in rural communities, requires more exposure to knowledge and skills to become sustainable. This suggests involvement from more

researchers and designers, but also expanding the network from one community to another. In this manner, design empowers women and equips them with the capacity to further empower other communities of women. The above model takes the research methodology and outlines the key steps for research, indicating the entry or exit points for researchers or participants. Documentation is seen as necessary to structure and formalises the process, allowing new entrants the opportunity to understand the full scope of the design process.

This research, which integrates participatory design as part of a co-creation process, provides a new framework for social innovation through design. The study was initially proposed as a means to teach, share, and improve the living conditions of Gudiya Village. During the initial ethnographic study, the observations revealed the breadth of existing knowledge used in the building of the village infrastructure. This significantly altered the direction of the study, as the researcher was learning during the process of teaching to form a symbiotic relationship.

The research process has produced valuable results evidenced by the ability of the women to acknowledge their existing skills, adopt and adapt with transferred knowledge, creatively produce new solutions, and actively identify new areas for design development. It was discovered during the evaluation stage that the initial participating 7 females had continued sharing the knowledge with other women in the village, after the researcher had exited the field. In learning a design process, they found value in the meaning of collaboration in design to form a community of practice. Social innovation can be sustained when these communities of practice continually evolve and exchange knowledge.

Conclusion

This paper discusses an ongoing research project that continues to explore other opportunities for the women of Gudiya Village to improve their living conditions and generate new means of income. The use of permaculture design has been integral to the women, who have applied it to their traditional ways of making and produced products addressing medicinal and beauty needs. As the women use natural building skills for sustainable development, their newfound knowledge can empower them to continually produce new designs and transfer their skills to promote social innovation beyond Gudiya Village.

This research examines the role of designers in facilitating co-creation and social innovation through participatory methods and knowledge sharing. The study began with a clear understanding of everyday life challenges and issues affecting the village. Through ethnographic observations, the researcher was able to identify a key area of focus and a potential design intervention. Knowledge sharing, by teaching and learning, was critical to the co-creative design process and enabled the women to transfer intentional and emotional values into the finished outcome. Although the biomass cooking stove serves as an improved solution, it represents the knowledge, skills, awareness and identities of the women. The limitations of social innovation are addressed in the framework, indicating where other knowledge sources or participants can enter the process and the key points to document progress for other stakeholders to exit. Insights, findings and framework of this research can be further expanded and tested against other contexts of culture and social issues.

Acknowledgements

This research showcases the work of Batul Pitha Wala, a 2019 MA Design candidate at LASALLE College of the Arts in Singapore. The case-study included in this research is a demonstration of her ongoing thesis work, which has expanded into developing a social enterprise model for the women of Gudiya Village. Any further queries or interest in future involvement with this project should be directed to pitha.wala@mylasalle.edu.sg.

The authors would also like to thank the women of Gudiya Village who have participated in this research study and provided rich insights for the furthering of design knowledge, collaborative frameworks, and co-creation approaches to social innovation.

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10. Innovative Techniques, Methods and Theory

Practitioners and researchers are invited to share and present new and innovative art, design and media techniques, methods and theory that have been developed. How is the materiality explored and expressed? This conference is interested in collating and discussing new and innovative methods and theory in both practice and research that draw on intelligence to contribute to resilience and sustainable futures for creative industries.

Academic Papers

Happiness Cards: A tool for designers to design for happiness

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Abstract

Happiness is a crucial factor for healthy living which influences both physical and psychological well-being of human. This paper is concerned with development and evaluation of a design tool, called "Happiness Cards". This tool was formed based on positive psychology, for helping designers to design for creating profound happiness. It consists of cards based on 24 character strengths and virtues introduced by Peterson and Seligman. Psychological exercises which are provided on the back of each card, could help designers to achieve a better understanding of the subject and be able to design based on psychologists' point of view. In order to evaluate this tool, two workshops were performed with 23 participants including design students or graduates in group of three and four. They were asked to generate concepts by using these cards and their feedback were collected by taking notes and recording videos. "Happiness Cards" were also evaluated by a professional group of designers, named Gumeh. The findings indicate that "Happiness Cards" could provide knowledge and inspiration for designers to be able to generate design ideas for happiness. The designers could use the cards in three different forms and four different phases of design and they found them very beneficial and efficient. However, some suggestions for modifications were made, which would be helpful in further development of the tool.

Author keywords

Happiness; Positive Psychology; Positive Design; Design for Happiness; Design Cards.

Introduction

Human being is always somehow looking for happiness and most of his/her activities are based on obtaining it. Happiness is essential for a healthy life as it influences human's well-being both physically and psychologically. It also plays a key role in the development of society, since happy people could be more efficient for this aim. It has been said that happy people are healthier, more active, more creative, more sociable, and more efficient in their jobs and their relationships (Lyubomirsky, et al., 2005). Due to statistics, although the level of comfort has enormously elevated by technology, inner-health and happiness of people has not been increased (Desmet, 2011). Therefore, it can be concluded that good living condition does not necessarily make people happier.

Spiritual masters and philosophers also consider happiness as a sign of health and meaningfulness. This meaning might be related to God, coordination with the universe, self-realization or other related subjects. They believe that by improving consciousness through practices, happiness will arise from inside whereas material desires and greed are its obstacles. Rumi who is one of the happiest spiritual philosophers, states that human being might be immerse in material welfare but feel unhappy; in the contrary he could live with minimum facilities but feel happy from inside (Rumi, 1250s).

Pleasure is related to external factors and lasts for a short time, however, happiness is associated with deeper and internal factors and also remains for a longer period. Dopamine and serotonin are two neurotransmitters which mediate pleasure and happiness respectively in the brain (Mandal, 2018). Dopamine can reduce the secretion of serotonin, therefore, it can be said that following more pleasure equals less happiness.

Happiness is not restricted to a specific place, time or circumstance and it can be experienced in any situation. It also isn't happening by accident or fate; it is something that each person can decide to have (Gentry, 2008). Most people think happiness only depends on situation, however Lyubomirsky and her colleagues identified three factors including genetic set point, circumstances and intentional activities, among them the less efficient one is circumstances. As it can be seen in Figure 1, the genetic which is fixed has about 50% influence on happiness and around 40% belongs to intentional activities which means happiness is something people can choose by their own attitudes, behaviors and actions (Lyubomirsky, et al., 2005).

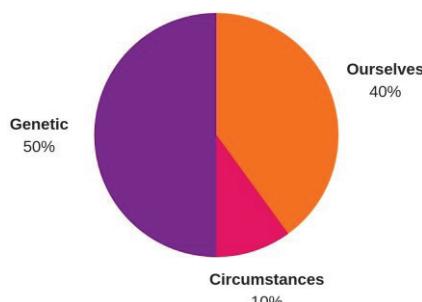


Figure 1. Three primary factors influencing the chronic happiness level (Lyubomirsky et al., 2005).

According to Dalai Lama; “Happiness is not something ready-made. It comes from your own actions”. As changing mindset and habits is not easy, practice is needed. Psychologists believe that for changing a habit, some stages should be accomplished. Therefore, many models were developed, such as “four stages of competence” (Figure 2). This model suggests that individuals are initially unaware of their incompetence and they perform tasks due to a habit (stage 1). When they recognize their incompetence, they consciously adopt a skill (stage 2), and then consciously use it (stage 3). Eventually through practice, it is possible to use the skill without consciously thinking about it (stage 4); this is when the individual has obtained competence in unconscious state (Burch, 1970).



Figure 2. Four stages of competence (Burch, 1970).

For this aim, in positive psychology numerous daily practices could be found. Happiness and flourish are related to positive psychology and different psychologist have different ways of categorization and classification of this subject but have similar kind of practices for them. Martin Seligman was first to introduce positive psychology. He presented PERMA which is a model of happiness (Seligman, 2012). This model includes five core elements of psychological well-being and flourish; positive emotions, engagement, positive relationships, meaning and accomplishment which is presented in Figure 3.

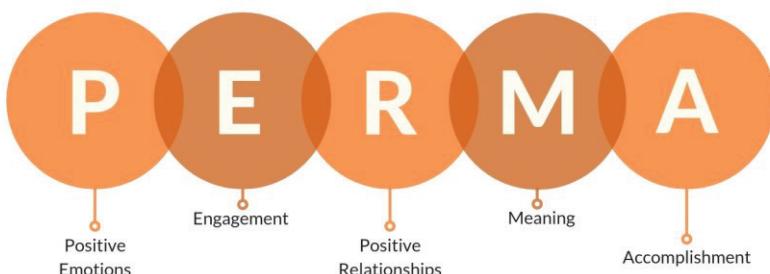


Figure 3. Model of happiness (PERMA), five core element of psychological well-being and flourish (Authentic Happiness, 2017).

In addition, Peterson and Seligman studied different cultures and identified 24 character strengths and classified them into six virtues; wisdom, courage, humanity, justice, temperance and transcendence (Figure 4).

WISDOM	CREATIVITY <ul style="list-style-type: none">• Originality• Adaptive• Ingenuity	CURIOSITY <ul style="list-style-type: none">• Interest• Novelty-Seeking• Exploration• Openness	JUDGMENT <ul style="list-style-type: none">• Critical Thinking• Thinking Things Through• Open-mindedness	LOVE OF LEARNING <ul style="list-style-type: none">• Mastering New Skills & Topics• Systematically Adding to Knowledge	PERSPECTIVE <ul style="list-style-type: none">• Wisdom• Providing Wise Counsel• Taking the Big Picture View
COURAGE	BRAVERY <ul style="list-style-type: none">• Valor• Not Shrinking from Fear• Speaking Up for What's Right	PERSEVERANCE <ul style="list-style-type: none">• Persistence• Industry• Finishing What One Starts	HONESTY <ul style="list-style-type: none">• Authenticity• Integrity	ZEST <ul style="list-style-type: none">• Vitality• Enthusiasm• Vigor• Energy• Feeling Alive	
HUMANITY	LOVE <ul style="list-style-type: none">• Both Loving and Being Loved• Valuing Close Relations with Others	KINDNESS <ul style="list-style-type: none">• Generosity• Nurturance• Care & Compassion• Altruism• "Niceness"			SOCIAL INTELLIGENCE <ul style="list-style-type: none">• Aware of the Motives/Feelings of Self/Others• Knowing what Makes Other People Tick
JUSTICE	TEAMWORK <ul style="list-style-type: none">• Citizenship• Social Responsibility• Loyalty			FAIRNESS <ul style="list-style-type: none">• Just• Not Letting Feelings Bias Decisions About Others	LEADERSHIP <ul style="list-style-type: none">• Organizing Group Activities• Encouraging a Group to Get Things Done
TEMPERANCE		FORGIVENESS <ul style="list-style-type: none">• Mercy• Accepting Others' Shortcomings• Giving People a Second Chance	HUMILITY <ul style="list-style-type: none">• Modesty• Letting One's Accomplishments Speak for Themselves	PRUDENCE <ul style="list-style-type: none">• Careful• Cautious• Not Taking Undue Risks	SELF-REGULATION <ul style="list-style-type: none">• Self-Control• Disciplined• Managing Impulses & Emotions
TRANSCENDENCE	APPRECIATION OF BEAUTY & EXCELLENCE <ul style="list-style-type: none">• Awe• Wonder• Elevation	GRATITUDE <ul style="list-style-type: none">• Thankful for the Good• Expressing Thanks• Feeling Blessed	HOPE <ul style="list-style-type: none">• Optimism• Future-Mindedness• Future Orientation	HUMOR <ul style="list-style-type: none">• Playfulness• Bringing Smiles to Others• Lighthearted	SPIRITUALITY <ul style="list-style-type: none">• Religiousness• Faith• Purpose• Meaning

Figure 4. Virtues and character strengths (VIA Institute on Character, 2017).

Every individual possesses all 24 character strengths in different degrees. However, each person is stronger just in few of them. By discovering the greatest strengths and using them in different aspects of life, flow and engagement could be experienced which leads to happiness. Flow is a state of immersion in the present moment while doing an activity. In this case, time seems to stop and noise, worries and hunger no longer could be felt. In order to experience flow, level of challenge and skill for performing an activity should be in a proper balance and both have to be higher than the average level of the person who is performing the activity (Csikszentmihalyi, 1990). Figure 5 illustrates the various results obtained from different combinations of skill and challenge levels.



Figure 5. Flow and other results obtained from different combinations of skill and challenge levels (Csikszentmihalyi, 1990).

Due to the importance of happiness, nowadays, design is also involved with happiness and subjective wellbeing, which is related to "Positive Design". Positive Design is a new approach in design, which is based on positive psychology, and its main aim is to attain inner-health and flourish (Desmet & Pohlmeyer, 2013). One of the active centers in this field is Delft Institute of Positive Design (DIOPD, 2019). They are trying to support meaningful experiences in life for people through human-product interactions (Pohlmeyer & Desmet, 2017). Positive psychology and happiness is a broad area with massive information. Designers who wish to design in this area need to obtain a good knowledge and understanding on these subjects which is time consuming and difficult. To facilitate design for happiness and help designers to be able to design, without a need to go through long term studies, it was decided to develop a tool in form of cards, which is called "Happiness cards". This paper presents this tool and its evaluation. Before introducing "Happiness cards", an explanation about design cards is presented.

Design cards

Many physical cards have been generated to assist or provide structure to the design process. These design tools are popular due to their simplicity, tangibility and ease of use. Designers use cards in order to make the design process more visible and clear. Cards are various in purpose and scope, duration, system, customization and formal qualities. For example, the purpose of the cards could be general, participatory design or context specific (Wölfel & Merritt, 2013). IDEO method cards which are one of the most famous tools for human-centered design process (IDEO, 2003) is "General" in purpose and scope, while its duration is "As needed" (Wölfel & Merritt, 2013). At the same time PLEX cards which are used for designing for playfulness (Lucero & Arrasvuori, 2013) is classified as "Context specific" in purpose and scope and it could be used at "Specific point" (Wölfel & Merritt, 2013).

As it was mentioned earlier design cards are used for different purposes. Recently a tool called "Design for Happiness Deck" was developed in Delft Institute of Positive Design, which is a tool that can be used to design for wellbeing (Delft Institute of Positive Design, 2018). These cards are formed based on the Positive Design framework developed by Pieter Desmet and Anna

Pohlmeier. Positive design framework has three essential aspects including Pleasure (happiness that comes from enjoying the moment), Personal Significance (happiness derived from having a sense of progressing towards a future goal and from the awareness of past achievements) and Virtue (happiness that is the result of morally valued behavior). Combination of these three components would lead to subjective wellbeing (Desmet & Pohlmeier, 2013). The framework is presented in Figure 6.

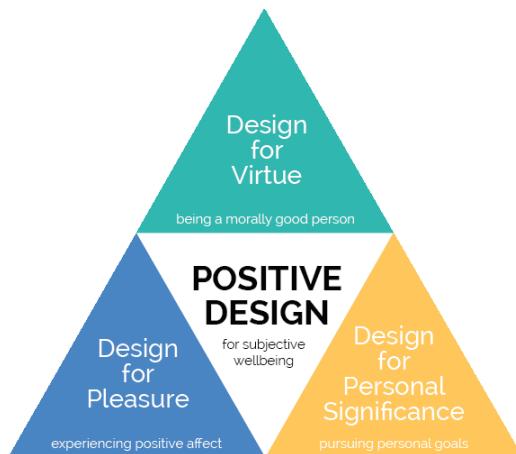


Figure 6. Positive Design framework (Desmet & Pohlmeier, 2013)

This tool includes 72 cards, 24 for each aspect of Positive Design; a general illustration with a title and explanation is given on each card (Figure 7).



Figure 7. Design for Happiness Deck (DIOPD, 2019)

Happiness cards

“Happiness cards” (Figure 8) are one of the results of the MA thesis of the first author which were presented in July 2018, based on science of happiness and positive psychology to make the process of design easier for the designers (Faghah Habibi, 2018). In order to generate this tool, positive psychology exercises were extracted from different sources, such as “Positive Psychology for Dummies” book (Leimon & McMahan, 2009), “Greater Good in Action” website (University of California, Berkeley, 2017) and “Happify” website (Happify, 2017).



Figure 8. “Happiness Cards”

The exercises were classified considering different patterns. However, after some investigations it was concluded that practices related to character strengths includes most of these exercises. Therefore, it was decided to use the classification of the 24 character strengths and add few cards to emphasize on some subjects. These subjects are Flow, Savor and Self-love.

The main approach for creating this tool was ‘research-through design’, which is based on making and testing prototype (Stappers, 2007). The first four cards provide general information regarding the tool and the way of using it. They also explain PERMA, design for happiness, the character strengths and virtues. The next 24 cards are related to 24 character strengths; each card has explanation about the subject and on the back of it, some psychological exercises related to that subject are presented. This is aimed to deliver inspiration to the designers. Figure 9 presents one of the cards in two sides.

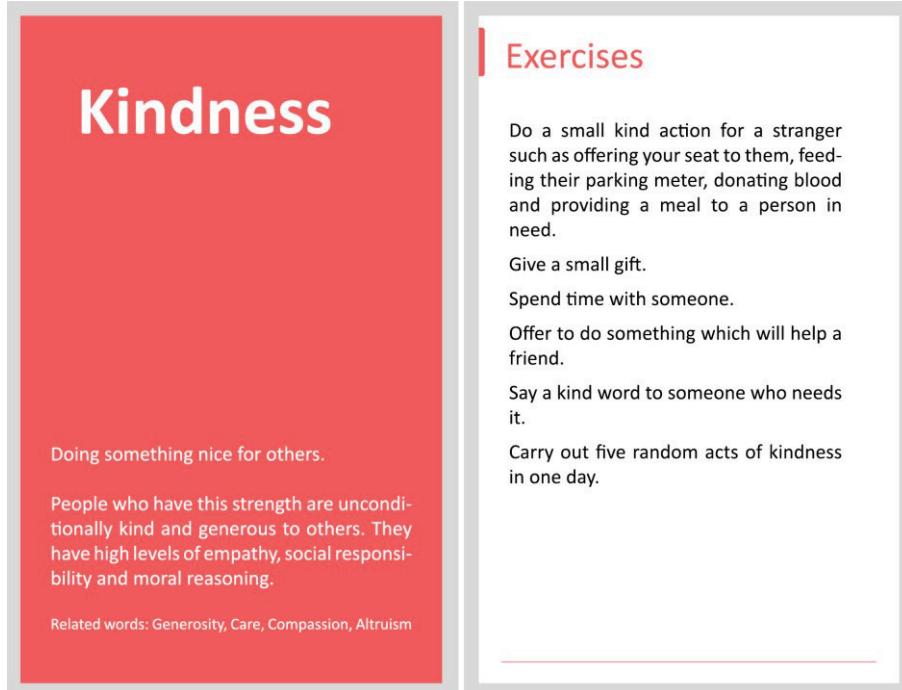


Figure 9. Two sides of "Kindness" card translated from Persian language.

"Happiness cards" are exercise-based and their aim is to inspire designers by providing psychological exercises which leads to happiness. These exercises are originally prepared by positive psychologist for people to practice frequently but could also be used by designers to help people preform these exercises easier without noticing them. Although "Design for Happiness Deck", which was developed parallel to the tool of "Happiness cards", seems similar to it, they have some differences with each other. As mentioned earlier "Design for Happiness Deck" was developed based on the three components of Positive Design framework. Therefore, it introduces subjects related to these components. However, "Happiness cards" aimed to present the positive psychological exercises as a source of inspiration.

In the MA project done by the first author, exercises were used as the inspiration source for concept generation. Some of the first ideas will be presented as examples.

Self-love

One of the exercises of Self-love is looking at oneself in front of a mirror and give the feeling of self-trust and approval without criticizing. Based on this exercise an idea was formed for the subway stations where people are drawn in dailiness. "Talking mirror" would be installed in a station and it would give messages such as "You are beautiful from inside and out!" or "Love yourself as you are" when people go to check themselves in front of it. Therefore, people

would come out of their dailiness for few seconds and it would act as a hint for them (Figure 10).



Figure 10. "Talking mirror", an idea based on a psychological exercise for Self-love

Hope

Another idea was formed based on an exercise related to Hope. This exercise is concerned with imagining and writing the goals and wishes of oneself. On the other hand, the subject of wish and hope could be linked to a rich Persian poem which is talking about making a boat and floating it on the water for reaching to utopia. It also says about this land which is strange and one shouldn't stay in it. This poem purports that one should do something to reach one's goals; strange land is symbol of staleness and stagnation whereas water is indicating fluidity and movement. Inspired by both the exercise and the poem an idea entitled; "I will make a boat..." was generated which has several steps:

- Writing one's goals and wishes on a piece of paper;
- making a boat through origami;
- floating the boat on the water such as sea, lake, pond, etc. (Figure 11).

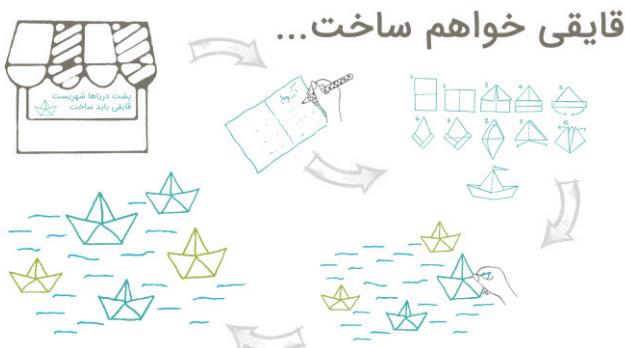


Figure 11. "I will make a boat...", an idea based on a psychological exercise for Hope

As it can be seen these excises could act as a source of inspiration and help in idea generation.

Evaluation

In order to evaluate the tool, it was decided to introduce it to designers through some workshops. For this aim, two workshops were held to observe the ways which designers use these cards, both entitled "Design for Happiness". In these workshops a total of 23 designers participated; seven at the first workshop and 16 at the second one which were divided to groups of three to four. These participants were both MA or BA students and graduates in the field of industrial design, graphic design and interior architecture.

The workshops carried out approximately in four hours which 40 minutes were dedicated to explain science of happiness, positive psychology, positive design, and how to design for happiness. In addition, some examples were presented and analyzed according to positive psychology, PERMA and character strengths. Afterwards, the tool was explained and the printed cards were distributed among the groups. The participants were asked to read and understand the cards in 10 minutes before using them in the process. In another 10 minutes, they discussed the cards with their group members and chose a specific subject to design for. After finding the subjects, they started to generate ideas based on the exercises presented on the cards by using post-its. This phase took about an hour. In the next phase they selected an idea from the generated ideas for further development. Then each group presented their concepts which totally performed in 30 minutes. At the same time, their concepts were evaluated by using the cards and finding the psychological values which were used in each concept. This performed by an assistant, during the presentation. The last 30 minutes was dedicated to question and answer. In this part, the participants could ask questions regarding the subject matter and also comment about the workshop and the tool. Therefore, they gave their ideas and made some suggestions. Notes were taken regarding the interaction of each group with the cards throughout the workshop. Their presentations and comments about the tool were also video recorded. Some photos of the two workshops can be seen in Figure 12.



Figure 12. Photos of the two workshops.

In addition, these cards were assessed by a professional group of designers called Gumeh. They were working on an interactive advertisement that aimed to evoke positive emotions and good feelings in society by using positive design approach and were willing to use this tool for generating ideas. This group consists of three MA industrial design graduates. They used these cards in a three-hour idea generation session.

Findings

In the first workshop which was consist of seven participants, two groups were formed. One group chose tidiness as a subject; they aimed to find solutions and ideas for tidiness based on positive psychology by using the cards. The other group decided to generate ideas based on some cards without choosing a specific subject. They selected curiosity, zest, humor, kindness and savor's cards. For the second workshop graphic designers and interior architects also attended. So there were three groups of MA students of industrial design, a group of graphic design students and a group of interior architecture students. Among three groups of industrial designers, first group aimed to bring happiness to pedestrians in the street. Second group intended to help bus passengers to be happier and the third group chose kindness to feral cats as their subject. The interior architects chose lighting as a subject; they generated ideas for designing a lighting which aimed to encourage people to be more kind and compassionate. The group of graphic designers worked on positive interaction between disabled and able people. In Figure 13 some of the outcomes of the two workshops could be seen.



Figure 13. Outcomes of the workshops and their presentations.

During the workshops, the participants used the cards as a source of knowledge for obtaining happiness science and inspiration. It was observed that they could choose their own way of using the cards. They could also find connections between their subjects and the different psychological titles. In addition, they used positive psychological exercises on back of the cards as an inspiration source for idea generation.

According to the participants, these cards helped them in finding subjects, generating ideas and increasing their speed in the process. It also gave them perspective and good information about the subject matter; they claimed that this information was equal to reading many psychological books and provided them with a comprehensive overview on all related topics of happiness. Moreover, they were so satisfied with the exercises which was given at the back of the cards and believed that it kept them in the right track of positivity and happiness. However, some preferred to have design examples, pictures and diagrams for better and faster understanding. They also had some suggestions which one of them was; separating the five character strengths' cards that have special impact on everyone's happiness, in order to emphasize on their

importance. Another suggestion was to provide different using strategies in the preface cards in order to increase the speed and decrease the vagueness. A participant said; “The lack of sustainable happiness in most aspects of our lives and society could be felt and providing a tool like this for designers is a good start for developing such an important issue”.

The design group of Gumeh, spent 30 minutes to read the cards individually and brainstorm some ideas based on them. One of the designers, chose a number of cards for this aim and the two others looked at all of the cards and wrote down any idea that came to their mind. Then they shared their ideas with each other. They had somehow the same comments and suggestions about the tool. They claimed that these cards helped them in increasing quantity of the ideas. One member had some knowledge about psychology and positive design, therefore she could understand the explanations and examples of the cards better than the other two. They also thought if the cards had design-related examples and pictures, it might have lessened the ambiguity.

Discussion

Comparing the use of cards by the workshop participants and the design group of Gumeh, showed that the second group could use it easier. That's due to the fact that they had enough information about the project such as knowing the user and the place of use, therefore during idea generation phase, the cards could act as an efficient tool. Since the workshops were short and the participants had limited time for the whole process, consist of receiving the knowledge of designing for happiness, understanding the tool, finding a subject, generating ideas and presenting their concepts, they assumed that an instruction or strategy to lead them through the full procedure was needed. However, the aim of this tool was to help in idea generation phase.

The way of using the cards by different groups could lead to generate some guidelines that is possible to be used as instructions for designers.

Due to the results of the workshops and Gumeh design group idea generation session, three different categories were identified:

- Starting without a specific subject and generating ideas by using the cards; This is when designer would like to choose happiness as the main subject. Therefore, design forms based on different psychological exercises. In this case designer tries to use different cards to provide values for the design as much as possible, because the aim is to design for happiness.
- Choosing a subject related to happiness; This is when designer intend to design a specific subject with the approach of happiness. In this case the designer could be inspired by psychological exercises presented on the back of the cards for both choosing the subject and idea generation.
- Starting with any kind of design subject and adding positivity and happiness to it; This is when the processes of data gathering have been nearly done and most of the information exists and designers would like to add a sense of happiness to their design. Therefore, they could be inspired by the cards in idea generation phase. This means the designer knows the subject and all

related aspects such as user and requirements and can find about psychological issues which could add values regarding happiness by using these cards.

As it can be seen these cards could be used in three different forms. During the two workshops, generating concepts in two forms were experienced and the other form was used by Gumeh design group.

Conclusion

This study, introduced the newly developed cards and explored the way of using them as a tool for helping designers. The evaluation process showed the strength and weakness of these cards. The benefits of "Happiness Cards" could be summarized as follow:

- For designers who wish to work on happiness as a subject, an approach or an added value to a specific subject, "Happiness Cards" could provide the required psychological knowledge, without a need for studying many books.
- The provided exercises on the back of the cards, not only could inspire designers and enable them to generate ideas, but also could help them to stay in the right path to design for happiness.
- The cards could be used as a tool for increasing the designers speed during the process of design, due to providing information and inspiring them.
- This tool could encourage designers to think about happiness and work in this area.
- "Happiness Cards" could help designers in four phases consist of choosing subject, idea generation, developing ideas and evaluating concepts.

Due to the results of evaluation, for further development of this tool the following changes could be carried out:

- Providing a visual instruction: It is helpful to provide a visual instruction to introduce all the cards, their different parts and the best ways of using them. The general information about happiness and designing for happiness which are now on the first four cards could be also added to this instruction.
- Using the designers' language: The exercises on the back of the cards are extracted from psychological books and the language is different with design. It needs to be changed in design language.
- Proving design examples: In order to make the tool more convenient for designers, there is a need for collecting related design examples for different exercises.

As an overall conclusion, it could be said that the cards could act as an efficient tool for designers to find out about the subject of design for happiness and encourage them to bring happiness in their different projects and enable them to find a subject, generate ideas, develop ideas and evaluate their concepts with the lens of happiness.

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Designing Meaningful Applications and Interactions for a Social Robot for People with Mild Dementia

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Abstract

People with dementia need support to remain independent. Social assistive robots (SAR) could provide support on some aspects. Even though research shows that people with dementia can be involved in doing research and designing technology, they are often left out. In this paper we will describe our attempts to co-design meaningful applications and interactions for a SAR for people with mild dementia, and the lessons learned while doing so. In co-design with people with dementia and their social context we explored possibilities to have meaningful applications and interactions with a SAR called Tessa (from Tinybots). Ten case studies were performed, which included a series of semi-structured interviews to gain insight in current experiences and specific needs with regard to Tessa. These needs were translated to applications and interactions, which in turn were evaluated with the participants. Parallel to the case studies we evaluated ideas and prototypes in several focus group sessions with elderly. Four applications have been prototyped and evaluated in a case study and/or a focus group session. Our study indicates that people with mild dementia still want to take initiative and that a product designed for them should empower them to maintain in control. We found recurring needs between different participants and recommend to invest time in building a relation with the person with dementia. This will lead to more input from them and their care givers. We learned that it is definitely possible to include people with mild dementia in a co-design process.

Author keywords

Interaction design; dementia; social assistive robot; music; guidelines.

Introduction

Our society is ageing and the number of people affected by dementia is growing rapidly. To reduce costs and improve quality of life, technology is expected to support people with dementia in their daily living by improving self-reliance and allowing them to live at home for a longer period of time (Rijksoverheid, 2018; Meiland, et al., 2017).

Dementia is a progressive illness that affects the brain, leading to the loss of the ability to solve problems or control emotions (Tapus, Tapus, & Mataric, 2009). This results in memory loss and changes in behaviour and personality. Normal tasks become difficult. People with dementia find it important to stay independent as long as possible (Rijksoverheid, 2018) but additional support is needed during the development of the illness. This support is needed to advance functioning, self-direction, resilience and participation of people with dementia, which is also called positive health (Huber, et al., 2011; Vernooij-Dassen & Jeon, 2016). Another form of support is directed at informal caregivers that allows them to maintain their caring function (Kaijo, van Exel, & Brouwer, 2015).

A form of additional support can be found in social assistive robots (SAR). They have the potential to function as a supportive intervention for people with dementia by stimulating them to interact with each other, producing a calming effect, and providing companionship, motivation and enjoyment (Mordoch, Osterreicher, Guse, Roger, & Thompson, 2013; Valentí Soler, et al., 2015). Emerging research in Human Robot Interaction suggests that people attribute social robots with social characteristics and roles (Young, 2010). This sounds promising but a difficult question is how to design such a social entity for people with dementia. Interactions between people and robots can include complex layers of social interplay, '*we can expect a person's interpretation of a robot to be rooted directly in how it is perceived within the context of the social human world*' (Young, 2010). According to Young this means that a designer should take a very broad, socially embedded and person oriented perspective to understanding robotic interactions. In the case of a complex group like people with dementia this demands for deep understanding of the context of a person with dementia and active involvement in the design process of new SARs. Unfortunately, when designing technology for people with dementia, too often potential users are left out (Savitch & Zaphiris, 2006; Wilkinson, 2002). This may be due to the complex nature of their illness. Research, however, shows that people with dementia can be involved in doing research and designing technology (Span, 2016; Whitlatch & Menne, 2009; Hanson, et al., 2007).

An example of a SAR that has been developed for people with dementia is Tessa from Tinybots. A caregiver can create and plan messages that Tessa will read out at the predefined time. For instance to remind a person to take a cup of tea.

There is also a possibility to add Yes/No questions. Tessa can ask: would you like to take a cup of tea? The person with dementia can answer the question and a caregiver can monitor whether the question has been answered. Another function is the option to listen to music: for caregivers there is a possibility to download music and play it for the person with dementia at a planned moment in time (for instance every morning at 10 o' clock). The goals of the developers are that Tessa, when used properly, can help giving structure during the day, activate people and play music. Although the interaction might still seem limited, Tessa addresses three areas of basic needs that Meiland has defined (Meiland, et al., 2017):

- To manage everyday life across the disease journey: Tessa can provide a reminder for activities, appointments and basic needs.
- Technologies to help people engage in meaningful and pleasurable activities: Tessa can make suggestions for activities, caregivers can send messages that support social interactions ('we are on our way, make some coffee') and play music.
- Technologies that aim to support professional organisations: Tessa has a monitoring function in the sense that answers to Yes/No questions are shown to (in)formal caregivers.



Figure 1: Tessa, social robot developed by Tinybots

As dementia is very complex and has several phases – in which needs of users and their social context vary – it is expected that it is difficult to develop a SAR that can be used for a wide variety of users and for a longer period of time. The window of opportunity for a SAR like Tessa might be small. However, Tessa is an example of a personalized robot that can be customized to personal needs. It is assumed that these robots are better suited for use by people with dementia than robots with fixed functionality (e.g. robot seal Paro and Zora) (Span, 2016).

Personalization or customization is important to the acceptance of a SAR (Pino, Boulay, Jouen, & Rigaud, 2015) and may contribute to the well-being of SAR users (Sharkey & Sharkey, 2010).

As has been pointed out, functionality of Tessa is still limited. Exploring meaningful applications and corresponding interactions for Tessa to support people with dementia is therefore valuable. To explore, design, prototype and evaluate new meaningful applications we need to understand the social context and the social interplay of people with Tessa. Hopefully this understanding, insight and examples of new applications will contribute to the development of new (applications for) SARs that help people with dementia remain independent for a longer period of time. This leads to the following research question: how can you design meaningful applications and interactions for a social robot for people with mild dementia?

Materials and Methods

In an explorative study, which included ten cases, we evaluated participant's expectation, desires, needs and experiences regarding Tessa. In co-design with participants, and inspired by their specific needs, we designed new applications for Tessa. We used the following approach and methods:

1. Due to the vulnerability of our participants we took extra precautions to safeguard more controlled and stable conditions for our case studies. All researchers tried out Tessa at home for two weeks. Several case managers dementia, who were involved in selecting suitable candidates for this study, tried out Tessa at their home environment.
2. This resulted in conditions for the field test (e.g. plug & play installation on location requires bringing a mobile WiFi hotspot), inclusion criteria (e.g. because of a small window of opportunity, participants should be in an early phase of dementia) and conditions for our own development (e.g. requirements for the API¹ that needs to be developed for Tessa).
3. The case studies started: In a period of 14 months, 10 field tests started. Each one unique in duration, personal situation and context. See Table 1 for details.

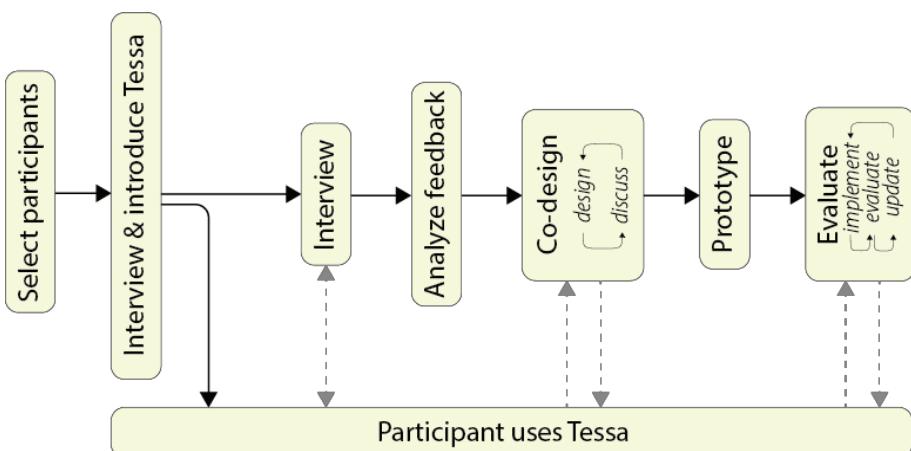
¹ API: Application Programming Interface. This allows us to create our own applications for Tessa.

Participant	Age	Gender	Home situation	Duration case study
1	80	Female	Living at home, widow	5 months
2	69	Female	Living at home with spouse	1.5 months
3	74	Female	Living at home with spouse	1 month
4	62	Male	Living at home with spouse	10 months
5	92	Male	Living at home, widower	8 months

6	80s	Male	Living in a home for elderly, widower	2 months
7	94	Male	Living in an assisted living facility, widower	6 months
8	90s	Female	Living at home, widow	1.5 months
9	80	Male	Living at home with spouse	1 month
10	87	Female	Living at home, widow	4 months

Table 1: Participants characteristics

As proposed by Young (Young, 2010), a designer should take a broad, socially embedded and person oriented perspective when designing interactions with robots. We therefore invested time in building a relation with each participant and limited the number of researchers per participant to make them feel comfortable in our presence. Figure 2 shows at which moments during this study participants were involved.

**Figure 2:** research and co-design process showing participant involvement

During the semi-structured interviews that were used for each visit, we listened carefully to the participants. Based on their responses we determined the duration of the test. Investigator triangulation was used to increase credibility of research results. Results and insights gained from the interviews were analysed by listening to audio recordings, discussing notes and structuring findings into a summarizing template per case. In co-design with participants we translated these needs into new applications: at several stages findings, ideas for possible applications, sketches and mock-ups were discussed with the participants.

4. Prototyping applications: four prototypes of new applications were developed (Touch activation, 'leaving home'-button, playing music and support in activities of daily living). One was a software solution (web-interface), the others contained both hard- and software elements.

Evaluating prototypes: Table 2 shows in which cases and focus group sessions each prototype was evaluated. The prototypes for *Touch activation* and '*Leaving home*'-button were implemented in the case studies and used in a period of several weeks. This meant that during the case study we updated their Tessa with the new application hardware and software. The prototypes for *Playing music* and *Support in ADL* were evaluated in a session with the corresponding participant.

Prototypes	Cases										Focus Group			
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	1	2	3	4
Touch activation	v			v	i	v	i		v	v	v	v		
Playing music	v				i	i	i				v	v		v
Leaving home'-button			i/v								v			
Support in ADL	v	i/v						i				v		

ADL = Activities of Daily Living

i: function inspired by case

v: function evaluated in case / focus group

Table 2: The use of prototypes in cases and focus groups

Feedback on the use of the social robot Tessa and on the developed applications, was gathered during semi-structured interviews in the case studies and in focus group sessions. There was a total of five focus group sessions. The sessions were done with a constant group of five participants (one male, four female). These participants did not suffer from dementia, but had extensive personal experience with people who were diagnosed with dementia. The participants from the focus group sessions were all elderly and none of them participated in the case studies.

Results

In this article we will focus on the findings regarding the designed applications and interactions. We will zoom in on two of the developed applications to show the potential of new interactions for people with mild dementia. Related, more general findings on the effect of Tessa on people with dementia are described by Janssen, et al. (2018).

A recurring finding on the interaction with the social robot Tessa is that it looks like – and behaves as – a social entity (p1, p2, p3, p5, p7, p9). This is not uncommon, research in the area of Human Robot Interaction has shown that people have a strong tendency to treat robots as social entities (Young, 2010). One user for instance found Tessa to be his new girlfriend (p5), while another participant thought of her as a busybody (p9), another one called her my neutral friend "that doesn't judge me" (p3). A general finding was that Tessa does not

allow for interaction and initiative from users. The only way to let Tessa say anything, is to program a message (often a reminder) at a predefined time. Several problems resulted from the predefined timing and lack of interaction possibilities:

- some participants did not hear messages (p6, p7, p8, p10);
 - some participants did not remember messages (p1, p9);
 - some participants needed to be reassured about dates and appointments (p6, p9);
 - participants that used the music function did not like the fact that music was playing at a predefined time (p6, p8);
- Overall, the participants found the interactivity of Tessa still limited and thought of ways to improve it.

In the next section we describe two applications created in co-design with participants and how we designed them to make them accessible. In doing so, we explored different interactions with Tessa keeping in mind design guidelines, specifically those relating to tangibility, simplicity and recognizability (Brankaert, 2016).

Application 1: touch activation

The ‘touch activation’ function was our response to several problems participants ran into. Several participants explained they often did not hear messages from Tessa. Tessa is bound to one location. When placed in the living room, you cannot hear what Tessa says in other areas such as the toilet or kitchen. Tessa cannot detect what the best moment for reading out a message would be. Another problem was the fact that people can get restless when they know something is going to happen (for example: a visitor will come), but they don’t know how long it will take. Most participants mentioned they liked it when Tessa speaks, but most of the time Tessa is silent. All these participants would like to be able to let Tessa say something at a moment of their choosing: they need to be able to initiate this action. The aim for this prototype was to study the potential of a more social and subtle interaction: will participants understand that touching Tessa leads to a response, will they remember how it works and take initiative to interact?

Design: the touch-prototype

A key element we took into account is the variety of wishes that have been mentioned above. We decided to design a general interaction, that can be linked to case-specific actions. Touching the social robot Tessa seemed an intuitive way to make contact with Tessa. To verify this we designed a prototype and integrated it into Tessa’s ‘head’. We integrated it invisibly to make the experience like touching someone on the shoulder (social), in contrast to pushing a button, which is what we do when interacting with most products (mechanical, electrical). To give some indication (a use cue) of the functionality, we placed a hand icon on the locations where Tessa would respond to touch. After an initial test of the basic interaction principle with one participant we

replaced the plant on Tessa's head with a hat and we removed the bowtie. This was the wish of one participant and it provided us with a place to add feedback for the touch-interaction (it could take a couple of seconds before Tessa responds with speech, the light feedback in the hat shows that your touch was successful).



Figure 3. Prototype of the touch-activation

We created multiple touch-responses and evaluated them in cases and/or focus group session.

1. Repeat previous message: Tessa will repeat the most recent message. This is useful when you missed a message or didn't hear it well enough.
2. Day and date reminder: Tessa will tell you the current day and date. This could support day-awareness and reduce stress (it is common for people with dementia to forget what day it is (Alzheimer's Association, 2018), this can make them restless (p7)).
3. Next agenda item: Tessa will tell you what the next item on the agenda is, and how long it will take before it takes place. This could reduce restlessness and help getting grip on the day (p6).
4. News headlines: Tessa will read headlines from the news. This could help being engaged in the outside world.
5. Weather forecast: Tessa will say what the weather will be for today. The main goal here is to break the silence.

Other touch-responses that were discussed with participants, but have not been implemented in this study, are a message to stimulate activity, making a joke and turning on music.

Evaluation

Four touch-responses were evaluated in their case studies and evaluated in focus group sessions. The results varied a lot. First of all, to be able to use this function the participant would need to remember it. Two participants (p7, p10) did not use the touch function, they seemed to have forgotten about this

function. Findings from de Werd, Boelen, Olde Rikkert, & Kessels (2014) and Elliott & Gardner (2016) show that people with dementia can still learn new things. We expect in this case one short introduction was not enough. A solution to this problem might be that Tessa reminds them of this function on a regular basis. The severity of dementia will also impact the use: impairment in executive functioning, apraxia and apathy are common amongst people with dementia and they progress as the dementia progresses (Nederlands Huisartsen Genootschap, n.d.; Drijgers, Aalten, Leentjens, & Verhey, 2010). This makes it less likely that they will initiate such an action.

Participants who used the function responded positively. One participant was even really moved by this new function. The interaction felt very personal, a bit like cuddling. It was in line with the expectations this social robot invokes. The fact that Tessa can now speak more often was considered pleasant and cosy. It breaks the silence.

Application 2: playing music

Many participants indicated that they would like a function that allows them to listen to their favourite music. This could be a radio station or something like a CD or playlist. We evaluated the music function that was integrated in Tessa in three case studies (p6, p7, p8). Insights gathered in these studies were translated into the design of a new interaction model for the music function. This design was evaluated in a focus group session and with one user from a case study (p3).

Evaluation current application

Getting the music on Tessa was complex (copy CD's to the computer, upload it to Tessa and create playlists in the web-app). Moreover, many participants like to listen to local radio stations, which is not possible on Tessa. The most important insight regarding listening to the music was the fact that direct control of the music was missing. With this we mean control over basic functions such as starting music, controlling the volume and stopping the music. In one case study this resulted in stress at the participant when the sound was very loud and he could not decrease it or turn it off. Moreover, speech and music volume could not be set separately resulting in either loud music, or spoken messages that could not be heard.

Not being able to initiate the music² decreases the added value, and not being able to stop³ it was even very annoying and made it socially unacceptable (not being able to stop the music when you have visitors).

Design: Prototype playing music

Taking the results of the evaluation into account, we designed a new interaction for the music feature. The cognitive and physical capabilities of the participants were taken into account, as well as design recommendations from Brankaert (2016) and Mäki & Topo (2009) for designing for people with dementia. In our design we implemented affordances (the interaction

possibilities perceived by the user of a product as a result of the product's design (Norman, 2013)) and use cues (indicators of how to use a product (Daams, 2011)) to obtain an intuitive interaction suitable for the participants.



Figure 4 - Prototype for playing music. Placing a disc on the spot in the centre will start the corresponding music. The audio volume is controlled by the white slider positioned at the front.

The design allows users to select music, and start and stop it by placing physical objects onto a platform that is placed under the social robot Tessa. The physical objects were three-dimensional tokens, each representing a different function (one for radio, one for a playlist). Placing an object on the designated spot – which was indicated by the corresponding shape of the object and the cut-away spot on the platform – will start the function. Removing it will stop it. For easy and quick control of the volume, a horizontal slider was used.

Evaluation

This prototype was evaluated in a focus group session and in a case study. In the focus group session, the platform and two tokens were given to participants and without explanation of how it works they were asked to turn on the radio. The 3D shape of the radio-object showed them that this was the object to use, and without hesitation they placed the object on the correct spot. The music started playing and the group explored what happened when moving the volume slider and removing the radio-object. It was clear to the group how it worked and which interactions were required to get the desired results. Unfortunately, this prototype worked completely stand-alone and in this focus group session it was demonstrated without Tessa. For some participants this made it hard understand the link between Tessa and this prototype: they were two separate things.

2 A playlist with music can only be planned using the web application. A direct control is not available.

3 After three songs Tessa will ask if you want to stop the music. It was not always clear to participants that they should answer with 'yes' or 'no'. There is no way to stop the music on other moments.

In the case study (p3) we introduced the prototype to the participant and informal caretaker. After a short introduction and explanation, the participant was distracted for couple of minutes to check if she would remember how it works. After this short distraction the participant was asked to put on some music. The participant immediately performed the correct action: grabbed the radio-object and placed it on the correct spot on the platform. The music started playing. Even though the participant understood and liked it, she had some ideas on how to improve the design of this function:

- Adding a volume sign including a minus on the left side of the slider and a plus sign on the right.
- Improving the grip on the slider handle.
- Making the looks personalizable (e.g. being able to put a cloth on it)

Next to these improvements the participant suggested a more intimate interaction: touching Tessa, possibly in combination with a voice command, could start the music. The touch-interaction was introduced to this participant a few weeks earlier for a different functionality. For this participant the touch function resonated with Tessa's socials aspect.

Discussion & Conclusion

Outcome limitations

The number of participants in this explorative study is limited and we did not reach saturation with these cases. However, this qualitative approach lead to transferable mechanisms and in-depth insights in both the complexity of designing for people with dementia and possible ways to approach this complexity. These in-depth insights will be discussed in the next paragraphs. Even though each case is unique we found that there are general needs. Most participants would like to be able to play music and most participants could use help with sequential tasks. As for the 'play music' application: in addition to the participant who responded very positively to our prototype, several informal caregivers and domain professionals labelled this concept as understandable and promising. We realize that these results are still preliminary. However, they do give an indication about the possibilities of new interfaces for playing and controlling music by people with dementia. This result also seems to be in line with the notion that people with mild dementia can still learn new things (de Werd, et al., 2014; Elliott & Gardner, 2016). Some interfaces were completely new to them and nothing like any other interface they used before, but still they understood how to use it.

Initiative

One of our first findings was that participants miss the possibility to initiate an action for Tessa. Not having this interaction possibility was however a deliberate choice from the designers of Tessa. Tessa is developed to support daily structure and give suggestions for activities (Tinybots, 2018). As previously described, initiative decreases as dementia progresses (Drijgers, et al., 2010). But even though this lack of initiative is growing, our study shows that people with mild dementia still want to take initiative and be in control. In our view, a product

such as Tessa should combine the planned reminders with the possibility to initiate an interaction. A product designed for people with dementia should empower them to maintain control.

Interaction design

The applications created in this study required new interactions with Tessa. In evaluating the applications we learned that Tessa is perceived as a social entity and an interaction design that corresponds with this social aspect can resonate with people with dementia. Remarkably, the design of the interaction does not need to be a familiar one (which seems not completely in line with the design recommendation on *familiarity* (Brankaert, 2016). We have seen that people with dementia can still learn and remember new interactions, which is in line with findings in other studies (de Werd, et al., 2014; van Tilborg, Kessels, & Hulstijn, 2011). We believe that a very simple and intuitive interaction should be a first priority when designing interactions for people with dementia. In the design process we learned that the availability of guidelines for designing for people with mild dementia is limited (van Rijn, van Hoof, & Stappers, 2010). Searching for articles on the ACM digital library, using the search term (+dementia +design +guidelines), resulted in two relevant articles (Hyry, Yamamoto, & Pulli, 2011; Hultgren & Endter, 2014). Many articles focus on the design of the environment or on the design process, not the interaction with products. In a wider search we found three more relevant articles (Brankaert, 2016; Mäki & Topo, 2009; Mayer & Zach, 2013). We experienced that including people with dementia and their context in a co-design process was very important. Moreover, we expect that the development of concrete guidelines for designing for people with dementia will be of great added value for designers and developers and it could speed up the process of product innovation.

Relation building & co-design

Investing time in building a relation with people with dementia has led to more input from them and their informal care givers. Researchers became familiar faces which resulted in more relaxed participants during the interviews and observations. We learned that it is definitely possible to involve people with dementia in a co-design process. A study on participatory design with people with varying cognitive impairments (Rodil, Rehm, & Krummheuer, 2018) describes similar finding: investing time in building a relations is important and including cognitively impaired people in a design process is possible.

Including our participants not only in the evaluation but from the start resulted in some grateful participants that showed growth in self-esteem. They could see (we implemented some of their suggestions) and feel they were taken seriously. They felt like equals, even if they originally were looking up to the researchers. Moreover, knowing their involvement in this study was of social significance relates to positive health (Huber, et al., 2011).

Recommendations or principles when designing for people with dementia

Previous studies describe several design recommendations or principles to take into account when designing for people with dementia: empowerment, social

context, familiarity, physicality, equitable use, flexibility, simple and intuitive, perceivable information, tolerance for error, low physical effort, size and space for approach and use, minimize complexity and choice and emphasize clarity and simplicity, positive and supportive feedback, learnability (Brankaert, 2016; Mäki & Topo, 2009; Mayer & Zach, 2013). What we learned in this study in relation to these recommendations is:

1. Empowerment and equitable use (non-stigmatisation) were very important for the acceptance of new products and applications by the users.
2. Focus on simple and intuitive interactions. Familiarity could help with this.
3. Familiarity should be considered broadly. Familiar elements are very important, but the interaction does not need to be a familiar one.
4. People with dementia can still learn new things.
5. Reduce or even avoid the possibility of making mistakes. Making a mistake can make a person with dementia very insecure and averse to the product.
6. Improvement is in the details (and a concept can fail when a detail is not right).
7. A prototype should work well and look finished (there is less room for imagination). Wizard of Oz works fine though.

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Co-design and Community Building Through Soccer

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Abstract

In 2015 CENTRO University relocated its campus to the America neighborhood, a complex urban area of Mexico City, with a severe lack of community bonds. As part of its commitment for the professionalization of creativity, the Social Design Hub of CENTRO promotes an experience and place-based education which encourages students to collaborate and build exchanges with neighbors that can add value to the community as a whole. The paper addresses the design, prototyping and implementation of a community soccer project co-designed with neighbors at a Social Design and Innovation Master's Degree Workshop. It gathers two and a half year of experiences and follow-up through different successful and failed initiatives. The featuring of this social design project and its follow-up seeks to share the lessons learned and contribute to the applied research and reflection on how a specific project can trigger new conversations and opportunities, while building trust and community bonds among participants.

Author keywords

Community soccer; social design; design for social innovation; social innovation.

Introduction

"The real work of social innovation is to fix our broken human systems. The way to do that is by inviting real diversity into our lives; seeing and then removing the boundaries between us" (Heller, 2014).

In 2015 CENTRO, a private university specialized in creativity in Mexico City, relocated its campus to the America neighborhood. This new location inspired the creation of the Social Design Hub, an initiative aimed at promoting collaborative design approaches and raising awareness on the potential of creative professionals to effect positive social change in their local contexts. Colonia America is a neighborhood located in the northwest of the city. Along with its surrounding colonias (16 de Septiembre, Daniel Garza and part of

Ampliación Daniel Garza), it forms a triangle bordered by two main avenues, Constituyentes and Observatorio, and the Periférico beltway. It is an area with a heterogeneous social composition, inhabited mainly by young adults and adults (OVIE, 2017), and characterized by a lack of recreational spaces, a disintegration of community life, criminal behavior among teenagers, and a growing climate of fear and distrust.

Social Composition			
Age group	America	Daniel Garza	16 de Septiembre
• 0 – 14 years	21%	21%	18.1%
• 15 – 24 years	16.1%	16.3%	15.6%
• 25 – 44 years	32.2%	31%	35.4%
• 45 – 64 years	20.8%	22%	20%
• 65 and up	8.8%	9.7%	10.9%
Inhabitants:	6,326	5,827	1,383

Source: OVIE: SNIEG. INEGI. Population and Housing Census, 2010.

Table 1: Local social composition. Social Design Hub. 2019.

Urban mobility is very complex, and the area suffers from chronic traffic congestion (most of our students and staff are car dependent). The poor quality of the built environment is a very important issue particularly for pedestrians. In addition, the absence of traffic lights over the main Constituyentes Avenue (removed over a decade ago), the unsafe and defective sidewalks and the perception of insecurity discourage people from visiting Chapultepec Park (the oldest and largest in Latin America) located just across the Avenue.

Since CENTRO's re-location to the Colonia America, one of the main challenges of the Social Design Hub has been the debunking of assumptions. On the one hand, among staff members and students regarding the negative stereotypes and prejudices of the neighborhood and its residents; on the other hand, among neighbors regarding the false beliefs about the institution and its negative impacts (i.e. that university swimming pools cause water shortages in the community, a false assumption because CENTRO has no swimming pool and is a LEED Platinum building with a rainwater collection system).

The Social Design Hub team is supported by a cross-disciplinary group of experts in the fields of design, arts, film and media, psychology among others. Strongly driven by collaboration and an experimental and human-centered design approach, the Hub has worked to change the mindsets and prevailing ideas inside and outside the university. For over four years, conversation by conversation, it has been able to approach and eventually bring together a diversity of stakeholders including public, private and religious institutions, neighbors, faculty, staff and students, to build networks and partnerships that have also led to a better understanding of the context. The result is a space

for the co-creation, design and delivery of a wide variety of activities, workshops and even sports events, that has had the participation of more than 350 neighbors (ages 4 - 84) and over 450 students (either taking the compulsory subject of Social Design in the 7th semester of all undergraduate degrees, the compulsory workshop in Social Design and Innovation in the Master in Design Studies, doing social service or volunteering).

Contrary to the prevailing view of other institutions in the area, which remain isolated from the community, the Social Design Hub seeks to promote an active exchange with its surrounding environment. In this regard, Cipolla & Bartholo (2014) have stated that designers have a responsibility towards their own contexts, this is, the places where they are, and they should seek to transform their situations "by establishing dialogical relations with those who live in the same context".

As part of the projects and actions (including educational activities, health campaigns and recruitment) the Hub has contributed to change the perception of both students and neighbors, and in the case of the former, to connect them to local services and resources they did not know existed. Likewise, it promotes the local consumption at the university by buying goods and services from the community and by inviting students and staff to do the same.

As already mentioned, since its founding the Social Design Hub has been able to organize and to take part in existing conversations. Despite the progress it remains a challenge to build a framework for stakeholder engagement and to raise awareness on the need of a holistic understanding of the local context and its underlying unattended problems.

Social Innovation, Design for Social Innovation and Social Design

In the past ten years, studies on social innovation, social design and design for social innovation have attracted increasing interest in various fields and from different theoretical perspectives. The following section contains a brief description of these concepts.

Social Innovation

According Phills et al. (2008) social innovation it is "a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals". Despite the general agreement on the novelty of the solutions and opportunities for solving a social problem in a more effective way (Mulgan, 2007; Manzini 2015), some authors place special emphasis on the diversity of features related to the positive impact on the quality of life (Pol & Ville, 2009) the promotion of societal goals (Young Foundation, 2006); the underlying idea of the empowerment of specific groups (Murray et al, 2010), the transformation and reconfiguration of social relations, power structures and system change (TEPSIE, 2014). Likewise, there is a wide range of possibilities when speaking about the many forms of social innovation, from processes, technology, ideas, interventions (Phills et al.), to new products, models, services (Murray et. al.), social

entrepreneurships, societal transformation (TEPSIE) and even ecosystems (SIX, 2019).

Design for Social Innovation

There seems to be an agreement about the value that designers bring to social innovation. According to different authors, design for social innovation is "the expert design contribution to a co-design process aiming at social change" (Manzini, 2015); the set of design skills that can be used as a tool for social innovation (Sherwin, 2012); "the methodology of design applied to the creation of new models, products and services that address the complex social and environmental challenges facing businesses, governments, society and humanity" (SVA, 2019); or as defined by Heller (2015) "it's interaction between people that takes responsibility for positive, systemic impact. It can take any and every physical or visible form, but it inevitably begins with the invisible dynamics and forces that drive human behavior. It takes place within the communities and systems it's working with, not outside them". Definitions on skills and contributions range from "working closely with participants to explore everyday activities and outlooks, and to develop design responses through prototyping, implementation and evaluation" (Armstrong et al., 2014); to design culture and creativity (Manzini, 2015); to design attitude as a "recognition of the integrative and generative quality of design and an increasing validation of design's capacity to act as a mediating discipline that is fundamentally about facilitating creative processes that contribute new meaning and break with traditional thinking in decision-making through deliberation, stewardship and action" (Amatullo, 2017).

Social Design

Social Design is a term that has been in use since around 2006 (Heller, 2018) and that has gained currency in recent years. As mentioned by Chen, et al. (2015) the concept has expanded beyond its traditional core and scope making it difficult to narrow. While it usually connotes a discussion on the necessary social condition of design, its definitions place emphasis on participation towards the solution of a shared, collective problem that prioritizes social ends over market demands. Armstrong, et. al (2014) argue that "the term 'social design' highlights the concepts and activities enacted within participatory approaches to researching, generating and realizing new ways to make change happen towards collective and social ends, rather than predominantly commercial objectives". In a similar way, authors Deserti, et. al (2018) define Social Design as a "movement that is characterized by a socially-oriented objective instead of predominantly commercial or consumer-oriented ends". Likewise, Cheryl Heller (2018) describes Social Design as a collective co-creation based on the ownership of the problem and the process by all participants and more precisely as "the design of relationships and the creation of new social conditions" that include "the physical and the intangible, the human relationships that create communities and form societies". Heller points out that "social design begins with a higher purpose that transcends commerce" and makes a clear statement on why it is not charity or corporate social responsibility. Following this idea of a more systemic approach, Cameron Tonkinwise (Lamadrid & Tonkinwise, 2016) emphasizes that "social design interventions should always be multilevel, dealing with some existing problems but also creating platforms for longer-term structural change" in

order to stop being “acupunctural” and become multistage and from within the system that is being transitioned, hence coined as Transition Design.

Social Design or Design for Social Innovation?

Some authors highlight important differences between social design and design for social innovation. In this regard, Ezio Manzini (2015) makes a distinction stating that social design has a charitable approach where design experts must work for free for marginalized groups that cannot afford the costs of design, an idea that has been rejected by other authors (Tonkinwise, 2015; Heller, 2018), while design for social innovation produces meaningful, sustainable solutions based on new social forms and economic models, not only meant for the poor and marginalized. Despite this, Manzini recognizes that the differentiation between concepts tends to overlap and have blurred boundaries, while other authors seem to use both interchangeably. An example of this can be seen in the description of the Social Design Pathways (2013) a matrix conceived “to enable designers to make more honest assessments of their social innovation efforts”.

Social Labs

Lastly, within the context of social innovation and the design attitude or the design tools and skills that are applied to it (design for social innovation and social design), it is worth mentioning the emerging global phenomenon of social labs or like-lab structures, which are seen as a new direction different from business-as usual responses to the most pressing challenges of our time (Hassan, 2014) and as tools for systemic change (Lab Matters, 2014). Developing under a variety of names and labels, these labs are fostered by a wide range of organizations and settings (public, private sector, autonomous, HEIs). Despite their heterogeneous approaches and understandings, some authors have pointed out common characteristics such as its social (collective), experimental (based on ongoing iterative approach) and systemic nature (its solutions aspire to address the root cause of the problem instead of the symptoms) (Hassan, 2014); or its strong tendency to be driven by human-centered design tools, rapid prototyping principles, co-production approaches, and its high strong interest in engaging with a wide variety of stakeholders (Papageorgiu, 2017).

A New Conversation

The Design of the Centro-America Initiative

“Social design forms a collective sense of self that requires people to look more deeply into their own community and place (...) it allows us to see what is unique about every instance and place, as well as the common needs that make us the same. It is a way to hear our own voices in context with the voices of others who are never herd. This is the transformative power of social design to change us, so that we can apply these mutualistic principles everywhere throughout our lives”. (Heller, 2018)

"The starting point for innovation is the awareness of a need that is not being met" (Mulgan, 2007).

In August 2016, the Master of Design Studies (MDS) at CENTRO and the Social Design Hub launched the assignment of Social Design and Innovation, a compulsory workshop aimed at students in their 2nd semester. The course was designed to be an intensive one-week, 30-hour workshop delivered in collaboration with an international guest professor and based on a theoretical and practical approach. Students would explore the concept of social design and innovation from a critical perspective, while acquiring tools and first-hand experiences with users and communities that lead to the exchange of ideas and the co-design of proposals for shared social challenges.

The first workshop took place under the guidance of guest professor Scott Brown, Coordinator of Academic Collaborations at The Parsons DESIS Lab at the time. As expressed by him (Brown, 2016), the whole process revolved around exploring the possibilities of the future relationships between CENTRO and its surrounding communities and inviting participants to think in speculative ways driven by design for social innovation. The participants were twelve students from the MDS (mostly faculty members at CENTRO) and three undergraduate invited students with backgrounds in Industrial Design, Visual Communication, Marketing, Public Policy and Administration.

The workshop was structured as follows:

1. Delivery and discussion of a theoretical framework for exploring the social aspect of social design (days 1-2);
2. Exploration of the neighborhood, its challenges, and the interaction with some residents (days 2-3)
3. Brainstorm, ideation and prototyping of solutions with the collaboration and feedback from neighbors (days 4, 5 and 6).
4. Design of devices (homework - 2 weeks)



Figure 1. Ethnographic fieldwork. Neighborhood walks. Social Design Hub. 2016.

A key component of the workshop was the close collaboration with five neighbors who were invited by the Hub. The participants represented diverse community backgrounds between the ages of 18 and 51. These included

"Miguel"¹, a 51-year-old former gang member and current street-vendor who was very committed to sports; "Javier", a 21-year-old man completing high-school; "Luisa", a 20-year-old university female student at the National Public University UNAM; "Marco", a 48-year-old librarian of the community's cultural center (Faro del Saber); "Raul", a 37-year-old neighbor and employee of CENTRO; and "Laura", a 46-year-old mother of three, grandmother and street-vendor.

Research

During the first part of the workshop (days 1-3) students were exposed to information and different perspectives on Social Design and Innovation and carried out ethnographic fieldwork, which allowed them to observe and experience first-hand the dynamics of the neighborhood, unknown to most—if not all—of them. The meetings and interactions between students and neighbors opened up the conversation on what was important for all of the participants (neighbors, students and staff) as a community. The exchange of ideas and new insights of the context was crucial for identifying challenges and opportunities.

Topics discussed included:

- The emptiness of the sidewalks and streets
- The lack of community engagement
- The high-speed of cars in the neighborhood (attributed by some students to fear of crime) and the dangers to pedestrians
- The recreational activities in the Faro del Saber community center (and the small number of participants)
- The pervasive sense of fear and distrust
- The perceived insecurity
- How to foster a sense of belonging and wellbeing

Brainstorming, Ideation and Prototyping

From days 4 - 6, students worked in four teams in scenario-building to develop what Scott Brown called as the "provo types" or prototypes carried with large speculative ideas that could spark conversations about possible future directions. Teams were supplied with materials (post-its, adhesive tape, paper and felt-tip markers) to brainstorm, capture their ideas and narrow them down to the best solution.

The selected ideas consisting of sports and artistic activities and walking tours to explore the street "altars", were presented to participating neighbors for feedback. The most popular proposal, on which this paper will focus from now on, was to create soccer matches between CENTRO and the neighbors. Nevertheless, the lack of sports facilities in the university was seen as a major obstacle; the collaborating group proposed closing the street as the solution.

¹ Names have been changed throughout this text to protect the privacy of private individuals.

The student team refined the proposal based on the comments and feedback and on the last day delivered the CENTRO-AMERICA project, which consisted in public activations to promote the exchange and bring people and life to the streets by co-organizing street soccer matches between CENTRO and the America neighborhood.



Figure 2 Brainstorming and ideation. Social Design Hub, 2016.



Figure 3. Workshop participants: students and neighbors. Social Design Hub, 2016.

Final Assignment: Designing Devices

As a final assignment, Brown instructed students to take the feedback of the last session with neighbors to refine their proposals and deliver a visual product in the following weeks. This could be either a short film or a poster, where design would serve as a tool to communicate and support the creation of new forms of interactions and community. This is "devices to inspire imagination, conversation and possibility" (Brown, 2016).

The final delivery of the CENTRO-AMERICA project consisted of two posters proposing the creation of a meeting point between the university and the neighbors (seen by participants as two different cultures) through the temporary closing of streets for sports, culture, food and music. According to the plan, the organization of soccer matches and activities in the public space would help to bridge the gap and build a common ground for mingling and exchange between groups, by reclaiming the street as a neutral shared space, that would help deal with the cultural, racial and economic differences.

As reported by neighbors and students, the workshop was an overall good experience which created a space for a new conversation, exchange and collaboration and helped in the change of prejudices. As far as the students were concerned, the inclusion of this new subject gave them the possibility to theorize and work collaboratively from a designer's perspective, using their skills (mediation, empathy, design thinking) in defining a common challenge with the neighbors and exploring possible solutions. As expressed by Amatullo (2016), is applying the design capacity to mediate and facilitate creative processes.



Figures 4 and 5. Pick, Espinosa, Prieto & Lozano.(2016) . CENTRO America. Social Design Hub.

For the Social Design Hub, it was an opportunity to strengthen relationships, deepen its understanding of the community and identify tools that could help to create new spaces and conversations between groups. Nevertheless, despite the popularity of the proposal, the task of organizing soccer matches in the street did not seem feasible in the short term. We did not have enough partners in the community, and even though we had conversations with many stakeholders, they were not sufficiently engaged with the community to do something different.

Future Directions

By the end of 2016 and the beginning of 2017, the Social Design Hub took part of a research project with the emblematic Palo Alto Housing Cooperative in Mexico City, 4.5 miles (7 km) away from the university. Founded more than 40 years ago and inhabited by 2000 people, the cooperative is located in what has become a very wealthy area of the city and surrounded by luxury office

and residential developments. Over the years Palo Alto has managed to overcome external threats, including the increasing real estate pressure, remaining as a small town with a church, safe streets, community center and schools. Nevertheless, the older members of the community are worried that the new generations might lose Palo Alto's sense of solidarity. (Malkin, 2017).

Part of the project's aim was to learn from other communities, share our experiences, encourage exchange and help build capacities by supporting each other. During a conversation that involved the Social Design Hub, a neighbor from the Colonia America, and a family from Palo Alto, we agreed to take the collaboration further by inviting our communities to participate in specific activities. The Social Design Hub would open its Film-City and Urban Gardening workshops to Palo Alto members, while Palo Alto would organize a friendly soccer match on their pitch against CENTRO and its neighbors.

The invitation was an opportunity to rethink the CENTRO-AMERICA project. However, it posed a new challenge and required a different plan to form and coordinate only one team instead of two. After contacting the participating neighbors and the students involved in the project, we agreed to use the name CENTRO-AMERICA to build one team with the collaboration of neighbors (4), students (4) and staff members (4). A former participant in the workshop, who was also a teacher at CENTRO, joined this new initiative with his undergraduate visual communication students by designing a poster for the match, while the Palo Alto Community designed white and blue t-shirts for each team.

The soccer match took place in February as a Saturday activity on the Palo Alto soccer pitch and the CENTRO-AMERICA team drove in a bus/minivan owned by one of the players. The event gathered friends and families and was followed by a small celebration where participants shared drinks and food.

All of the neighbors and two of the students that participated in the Social Design workshop took part in the activity.



Figure 4. Team Picture. Social Design Hub. 2017

Findings:

- Most of the members of the CENTRO AMERICA team had a very positive attitude, were curious and interested in the collaboration.
- The integration of one team opened the possibility to reaching out for more participants interested in playing soccer (either at CENTRO or in the community)
- Despite the overall good attitude, one of the neighbors playing in the team abandoned the game, complaining that he was not going to get money and that he was not competing for anything, thus it did not make any sense for him to risk injury. The comment pointed to a lack of engagement and interest among some participants.
- The lack of sports facilities at CENTRO and in the America neighborhood was not a barrier to organizing a friendly soccer match.



Figures 5 and 6. Team shirt delivery and match in progress. Social Design Hub, 2017.



Figures 7 and 8. Poster and social get-together. Social Design Hub, 2017.

Another important aspect of this match was the creation of a short video produced by professor Angelica Carrillo in collaboration with CENTRO's film students and staff. The aim was to share the experience of the soccer match and the gathering. The video was used for social media and featured in the exhibition *In Solidarity: Living and Making, Together* (March - June 2017) held at the MUCA Roma, a venue for contemporary art, design and architecture attached to the Universidad Nacional Autónoma de México. Residents from the America and Palo Alto neighborhoods as well as students attended the inauguration.

Being Comfortable with Uncertainty

In January 2018, the Social Design Hub faced a new challenge that became an opportunity: a neighbor contacted the university with requests that were beyond our remit. Nevertheless, this triggered a new conversation. As a result, the Social Design Hub planned a pilot soccer tournament that would be sponsored by CENTRO and included four teams. The team "Shuna" organized by the neighbor in question, CENTRO-AMERICA, and two more teams from private institutions in the area. The location would be the indoor soccer field located at the Deportivo Constituyentes, a public sports facility in the nearby neighborhood of Daniel Garza, less than a mile away from the university.

According to our pilot plan if we managed to get more staff and students from other institutions into the field, as well as more neighbors, we could lay the foundations for a larger network, create bonds and bring a more real-life holistic picture of the community to institutions that expressed interest but remained isolated. This seemed like a great opportunity to bring together stakeholders in a neutral space.

But the tournament did not go as planned. The teams from the invited institutions did not show up, arguing that Saturday was not a business day and that made it difficult for their staff. Therefore, the three games were played by CENTRO-AMERICA and "Shuna", who defeated our team. The activity had a final get-together at the community sports center where participants shared food and drinks prepared by some of our other neighbors and catering providers. Despite the effort, the interaction between participants was minimal, if not nonexistent. Many unanswered questions remained.

What Went Wrong?

A further analysis of the tournament suggested that the previous Palo Alto experience had been successful due to the design process and the engagement of participants who were also co-organizers of the activity. From the journey in the minivan provided by one neighbor, to bringing food and beverages, designing a poster and a T-shirt and even the making of a video. They had been part of a continuing process and a conversation that, for many of them, began in the Social Design Workshop in 2016. Our previous experiences have shared a process of exchange, interaction and uncertainty. The Social Design Workshop was an initial exercise to flow towards ideas of the future and collaborate in the so-called provo-type of the CENTRO -

AMERICA project. In a similar way, the Palo Alto soccer match, was also an open collaboration that took up the idea of street soccer and turned it into reality by teaming up and flowing with the possibilities. In other words, by observing, listening, communicating, collaborating, visualizing, prototyping, refining, engaging and so on, we had been able to design a successful initiative.

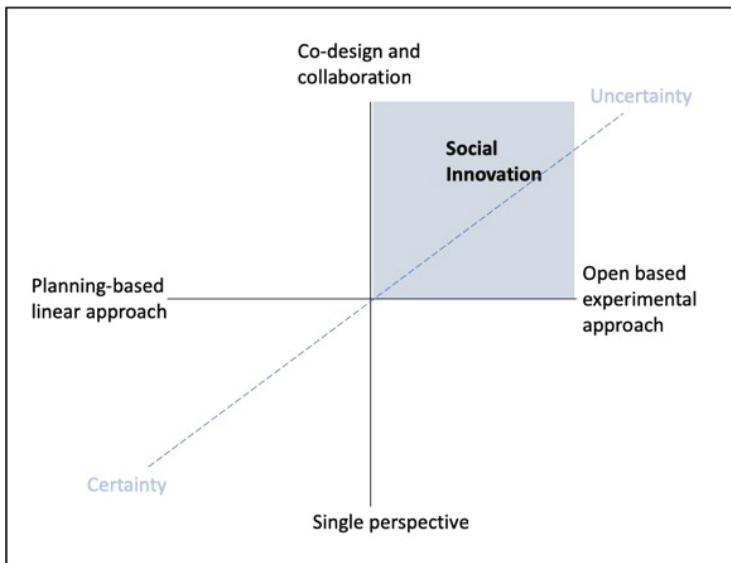


Figure 9. The context for social innovation. Social Design Hub. 2019.

In contrast, the pilot soccer tournament had too much of a planning-based linear approach, that did not take into consideration the stakeholders from the initial phases to get feedback and ensure the ideas were relevant and desirable (Papageorgiu, 2017); this was also missing from the design process. In this regard, Zaid Hassan (2014) exposes the paradigm of the planning-based approaches (which tend to fail) and the demand of new visions required by complex challenges based on prototyping-based approach.

Expressed differently, the tournament was a project done in silos, and it was focused on planning for certainty (and success) by pre-selecting (without the stakeholders' involvement) four teams. Furthermore, the neighbor who had approached CENTRO with requests was not even playing as part of the "Shuna" team. As a Social Design Hub, we had failed to create the conditions for creativity and innovation by lacking a human-centered design and an open-based, experimental approach to the project. We failed, as Heller (2018) would point out, in the collective co-creation and the process, in the design of relationships.

AI CENTRO de la Cancha

Summer edition

"Design for social innovation works from the inside out, which is the only way that real change ever happens." (Cheryl Heller, 2014)

"The places we share have a lot of potential to help us connect, reflect and make sense of our communities and our lives together." (Candy Chang, 2016)

In the aftermath of the pilot tournament an informal encounter with "Miguel", who had been taking part of all the initiatives since the first workshop in 2016, re-ignited the conversation around community soccer. He wanted the university to sponsor his soccer team and pay their registration fees to enter soccer tournaments held around the city. But sponsoring a team to play in locations outside the community would not really advance our objective of building bridges and creating social fabric.

Based on our past experiences and learnings, we recalibrated with a human-center approach and looked for stakeholders in order to organize a meeting to explore the idea of a community tournament. The meetings included new participants from CENTRO (faculty and staff), our neighbor "Miguel" and the priest (also a resident of the Colonia America) of the Nuestra Señora de Guadalupe Church, located in the heart of the neighborhood. After a couple of sessions where we reported on the case of CENTRO-AMERICA, Palo Alto and the failed tournament, we agreed to launch a summer tournament sponsored by the university at the Deportivo Constituyentes' indoor soccer pitch. This time, we made an open call for teams in the surrounding area and disseminated with the support of our partners and through posters, parish announcements and visual adaptations for social media and WhatsApp. Many people reached out asking for more information and the first six teams to do so were accepted.

The tournament turned out to be a great success with teams playing two games every Saturday at the community center. The priest registered the Futbol Club Guadalupe team, and played as the captain with teenagers from his pastoral group. "Miguel" did not play anymore under the name of CENTRO-AMERICA and registered his team, Atlético de Madrid, formed by friends and family members, including "Javier" and his 11-year-old son. CENTRO managed to organize one full team that played under the institution's name and included "Marco", the librarian and neighbor, and employees (students did not commit to participate due to the summer vacation). The URSS team teenagers from different high-schools in the area who met at the Escandón Sports Center, while Oro were teenagers from the Colonia America and friends from a high-school in the Colonia Escandón. Manchester City was suspended from the tournament after not showing on time for the matches and it was replaced by an external team made up of CENTRO employees.

The teams played each other for six weeks (twelve matches), leading up to a semifinal and final match. The champion was the Atlético de Madrid. The 1st and 2nd places received sports equipment as a prize to encourage them to keep practicing and playing together. A final get-together was organized at the

university in order to share with the participants and their families some food and beverages prepared by "Patricia" our neighbor and catering provider. Visual devices such as photos, posters and videos of the tournament were exhibited at the event.

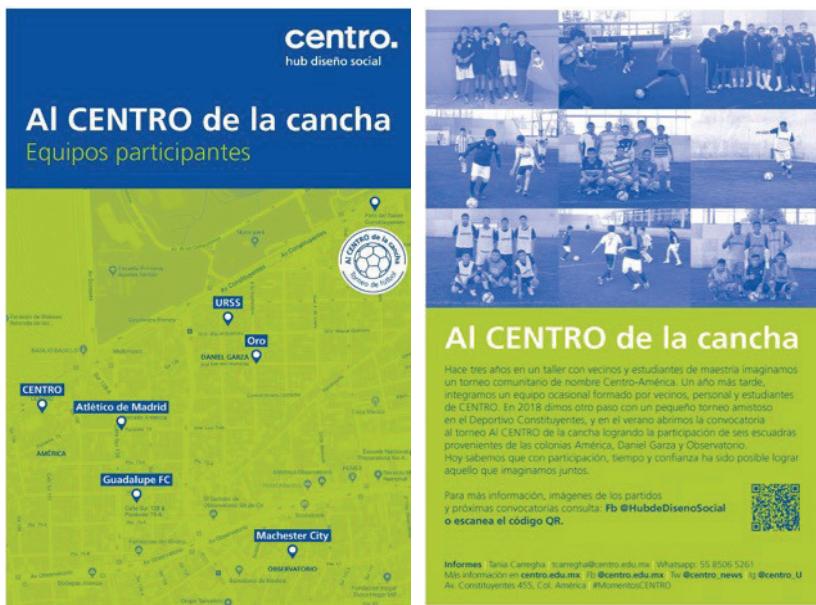


Figure 10. Front and back image. Summer Tournament Postcard. Origin of participating teams and tournament story. Social Design Hub. 2018.

AI CENTRO de la Cancha - Summer Edition 2018	
Quick Facts	
Entry requirements: teams of 11 players, live or work in the area, age 10 and up, mixed or same-gender teams. No registration fee required.	
Participating teams and age range:	Neighborhoods:
<ul style="list-style-type: none"> URSS: 16 - 18 years CENTRO: 24 - 45 years Oro: 16 - 18 years FC Guadalupe: 16 - 39 years Manchester City: 16 - 19 years Atletico de Madrid: 11 - 55 years 	<ul style="list-style-type: none"> América (2 teams) Daniel Garza (2 teams) Observatorio (1 team)
Total players: 66 (55 neighbors, 11 CENTRO employees)	Total matches: 14

Table 2. Summer Tournament. Quick Facts.

Testimonials:

After the matches participants from different teams shared stories for testimonials. Such as:

Our team belongs to the parish Our Lady of Guadalupe, located in América neighborhood. (...) Most of us are young, the eldest is 33 years old. Even the priest plays on the team (...) This tournament caught my attention because, during all my life, there had never been a tournament with the participation of local institutions. This lets us get to know each other because at the end of the day our lives are very different (...) In difficult situations, people feel the need to come together. And what better way to do it than through sports? (Team player from, Guadalupe FC)

My team has been playing together for around 6 or 7 years now (...) We've had the chance to get to know teams that are from other neighborhoods. (Team player from Atlético de Madrid)

My experience at the tournament has been very good, very exciting, and we really want to win. (Team player from Manchester City)

We come from different neighborhoods, but most are us are from around here: Daniel Garza, Observatorio or Tacubaya neighborhoods. Everyone at the tournament has been very kind and attentive and that's something that you can't find at other tournaments. This interaction, for example, can't be found at almost any other soccer league. (Team player from URSS)

There are good rivals, honestly, like team URSS and team Manchester City. (Team player from Oro)

This tournament managed to bring together people from neighborhoods close to CENTRO, which generates a sense of community and lets us get to know one another. (Team player from CENTRO)

I enjoy playing soccer very much. Since my first semester, I had wanted to join a soccer team at CENTRO. I wanted to put something together, but I had not had the chance before. (Team player from Capibaras)

The tournament has helped us meet new people from the neighborhoods around CENTRO. We've met people from the church and from other teams who have even helped us out during some matches. We've also let several people from the area join our team. All of us cheer each other on. (Team player from Capibaras)



Figure 11. Get-together and exhibition. Picture with members of Atlético de Madrid, Oro and F.C. Guadalupe teams. Social Design Hub. 2018.

Fall Edition

Followed by the success of the soccer tournament and having created a network of stakeholders in the community with a common interest, we consulted participants and decided to open the call for the Fall edition. We made changes based on the feedback including more matches, in order to play every Saturday, and established new rules (to avoid no-shows). We also managed to get a sponsorship from Voit sports brand for the rental of the field, referee fees and prizes. Eight teams entered the tournament, six of which had participated before (five more asked to join but could not because of the capacity of the match scheme). The new participants were Capibaras FC, a mixed-gender team integrated by CENTRO's undergraduate film students (eventually completed with members of the URSS team) and Franco-Canadiense, another mixed-gender team composed of a group of friends from the surrounding neighborhoods.

The teams played each other on seven occasions from October to December 2018. Even though the tournament was meant to include more than double the number of matches, so that all teams could play against each other, changes in the local administration led to cancellations of rental dates of the facilities with very short notice. As a result, only 28 matches were played.

Despite the difficulties we faced with regards to renting the field, most of the teams kept engaged and committed. Even when the URSS dropped out of the tournament, because some of the players could not attend anymore, the captain and two other players were invited to join Capibaras FC playing alongside CENTRO students for the rest of its matches. The final game was between Capibaras FC and Atlético de Madrid ("Miguel"), from the latter, was the winner for the second time. To celebrate, a get-together was held where participants shared food and drinks served by "Patricia", our neighbor, and looked at photos and videos of the matches. The winners got backpacks, sports jerseys and soccer balls, sponsored by the Voit sports brand



Figures 12 and 13. Images of soccer tournament with Capibaras, Oro and Atlético de Madrid teams. Social Design Hub, 2018.

AI CENTRO de la Cancha - Fall Edition 2018

Quick Facts

Entry requirements: teams of 11 players, live or work in the area, age 10 and up, mixed or same-gender teams. No registration fee required.

Participating teams and age range:

- URSS: 16 - 18 years
- CENTRO: 24 - 45 years
- Oro: 16 - 18 years
- FC Guadalupe: 16 - 39 years
- Manchester City: 16 - 19 years
- Atlético de Madrid: 11 - 55 years
- Capibaras FC: 19 - 24 years
- Franco-Canadiense: 16 - 24 years

Neighborhoods:

- América (2 teams)
- Daniel Garza (3 teams)
- Observatorio (1 team)

Total matches: 28

Total players: 92

(66 neighbors, 11 CENTRO employees, 15 CENTRO students)

Table 3. Fall Tournament. Quick facts.

Current status

in January 2019 the local public administration published an open call for a soccer community Winter – Spring tournament that is currently being played at the Deportivo Constituyentes. None of the local institutions and organizations in the area that have taken part in the previous tournaments were invited to co-organize or participate. It is worth mentioning that since the beginning of this initiative (previous and current) local governments have been invited to collaborate in order to widen the impact and facilitate the bureaucratic processes for renting the field. But despite having their presence at the closure of our Fall tournament and final match, it has not been possible to create a common ground for collaboration and support.

Conclusions

This paper has focused on giving an overview of the creation and development of a community soccer tournament under a design-based approach. A project emerged as the result of challenging common or “business-as-usual” approaches (Hassan, 2014) and recombining the existing resources through new conversations among community members and stakeholders.

It is important to consider that the emergence of the tournament project and its success was possible through the use of design tools and skills that not only triggered the initiative but have been essential for its continuity.

For over two years, community soccer became itself a dialogic tool for debunking false assumptions, stereotypes and prejudices, as well as for opening or re-starting conversations with neighbors and potential stakeholders. During this time, it managed to bring together many kinds of stakeholders in different stages of the process and increase awareness about community issues. It also became evidence that collaboration with the outside community can result in positive interactions and exchanges that do not represent a threat for participating students or staff (in the case of the institutions that have been in the area for decades with closed-door policies).

Despite not being collaborative in its nature, but rather an adaptation of a previous successful project, the current community tournament is a sign of change with regards of the role local authorities should be playing in the delivery of recreational activities for the community.

In regards to change, the project has also helped in the development of resilient mindsets in some participants, who are better prepared for dealing with change, uncertainty and the unexpected. We are also confident on the power of interactions and the unique contribution that design skills and tools can bring to it.

This and other collaborative experiences of the Social Design Hub strongly suggest that the lack of a human-centered-design approach and design skills in the community groups have resulted in a poor understanding of local issues, isolation from community life, a lack of engagement with neighbors and business owners, and poor institutional responses. In this sense, there are reasons to believe that the continuous conversation over the soccer tournament with a stakeholder (active in joint projects for health services) has led to a slow transformation regarding its community interactions and decisions.

Through the successes and failures of our work, we have been able to learn to co-create the conditions (relationships, conversations, build trust, evidence) and use the design skills for the creation and delivery of new projects. As such, recent research on the landscape of social innovation labs suggests that these are strongly experimental and “driven by human-centered design tools and rapid prototyping principles” employing “co-production approaches around workshops to generate ideas, break down silos, and facilitate multi-stakeholder collaboration for driving systemic change” (Papageorgiu, 2017).

That said, for the near future, we are planning to take the initiative to a new level by launching a social innovation work group (or a social innovation lab effort) with community stakeholders (many of whom have been part of the soccer initiative). The aim is to establish a common ground to understand the community from a systemic approach, be able to identify its challenges and respond in new and efficient ways. Only thus, it will be possible to think and act collectively, towards a better future.

Finally, regarding the soccer tournament, we are in conversations with stakeholders and the Chapultepec Park (located across Constituyentes Avenue) and exploring possibilities for launching a collaborative sports project in the Fall 2019. A proposal to be considered at the social innovation work group. Likewise, two film students from the Capibaras team have decided to join the Hub as their social service project (Mexico requires all undergraduates to complete 480 hours of social service) and are currently working on a new proposal with separate gender teams to continue with the soccer initiative.

Acknowledgments

We thank all the neighbors, students and staff of CENTRO who have participated to make this project possible, as well as the Palo Alto Cooperative. Special thanks to Tania Carregha, Jair Bernal and the design experts of CENTRO who have supported this initiative over time in their different fields.

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Professional Papers

The Visual Driver; promoting clarity and coherence.

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Abstract

Drawing from a research-based case study for a vision support charity, this professional paper articulates the role of a 'visual driver' as a key tool in shaping a rebranding. The 'visual driver' is a visual-based rubric of nine subjects, each with an image critically selected to capture the personality and essence of an entity. The paper discusses challenges around identifying the subtleties of a brand, how it behaves, its world outlook, its tone of voice. All difficult to define. However, once established, the designer's journey towards creating a successful brand with personality becomes clear. Furthermore, the participatory nature of the 'visual driver' rubric – as it passes between designer and client, communicates early ideation as well as initiating an informed dialogue between multiple parties. The flexibility, accessibility and the participatory nature of this method are especially critical when working alongside clients with sensory impairments. The case study within the paper demonstrates the flexibility of the 'Visual Driver' to incorporate textures which enhance the effectiveness of the tool for an organisation dealing with visual impairment. The paper articulates how the 'visual rubric' enables designers to work collaboratively with clients, comparing their creative thinking and ensuring a better awareness and understanding of the brand challenges from client and end-user perspectives. Increasingly, developing a modern brand strategy demands a multiplicity of additional sensory feedback— aural, touch sonic etc. The paper concludes by presenting and discussing how a multisensory 'visual driver' was used to facilitate a rebrand.

Author keywords

Brand Strategy; Multisensory Branding; Organisational Development, Design Thinking, Participatory Design Process. Graphic Design Process.

Introduction and the theoretical underpinning

The term 'Branding' within the current creative sector, is a relatively new term, that has become ubiquitous when discussing product and service merchandising, however, its historical impact can be traced back to Anglo Saxon times when farmers using uniquely designed hot metal forms branded their livestock to ensure ownership rights. The term Branding derives from the Nordic term 'brandr' (Clifton, et al, 2009.) that means literally to burn. Its success and impact depends not only on how it differentiates itself from the competitors (George and Anandkumar, 2018), but, more importantly as this study sets out to establish, how it communicates with its audience. This final aspect is central to this study; it is the fundamental reason why brands resonate with their audience. As audiences become more complex the need to harmonize a branding message with all stakeholders, not only the traditional consumers but its staff, central government, press, financial analysts, competitors etc., is ever more important. Today, the corporate reputation is recognised as a very valuable resource which has to be managed from the centre, in a coherent, sophisticated and long-term fashion (Olins, 2008). The 'visual driver' is central to the way that these complex decisions can be made, in an accessible and inclusive way.

The 'visual driver' is a visual-based rubric of nine subjects (Figure 1), each with an image critically selected to capture the personality and essence of an entity (Figure 2).

The 'visual driver's' historical origins can be aligned to Kurt Lewin's Organisation Development (OD) that emerged during the 1930's to drive change within large organisations. One of the developments derived from that was an intervention based theory called Organisational Climate, that identified the mood or personality of a business (Trullen and Bartunek, 2007). This is particularly closely aligned to the creative practice of using Visual drivers, in that it interrupts current ways of thinking and offers the participants new ways of approach. Trullen and Bartunek also emphasise that the originators also have a clear map of what they all want and need to accomplish thus becoming committed to that ideal. Those values align perfectly with the intent of the 'visual driver'.

<i>Car</i>	<i>Animal</i>	<i>Shoe</i>
<i>Colour</i>	<i>Font</i>	<i>Place</i>
<i>Activity</i>	<i>Chair</i>	<i>Celebrity</i>

Figure 1. The Visual Driver template, a collection of nine subject areas.



Figure 2. The Visual Driver after the collaborative design process, the personality of the brand is evident; uncompromising, larger than life, exciting, daring.

Studios use a whole variety of different methods for visually capturing the essence of a client/project/brief. In our experience Mood boards are the most commonly used tool for this task. McDonagh and Storer state that “Mood boards potentially provide the designer with a sensory-centric (i.e. beyond the visual) approach to aid their communication and encourage inspiration/innovation” (McDonagh and Storer, 2004).

We first came across the use of ‘visual drivers’ in our professional practice when we sat in a presentation by Landor to a client we were working with at the time. We have used this tool both in our professional practice and in our teaching of undergraduate Graphic Design students ever since.

We have adapted the tool to our needs and now use a version of it on every project within the Branding pathway at Northumbria University Newcastle, BA (Hons) Graphic Design course. As McDonagh and Storer suggest “Mood boards have complex and multiple functions. They can be used to express and communicate emotions, feelings and/or moods. In addition, they are intended to promote lateral thinking around what may otherwise be a mundane design task” (McDonagh and Storer, 2004). This Professional paper starts to articulate why we believe that ‘visual drivers’ are a distinctly different tool from mood boards in that they are more specific in helping the designer define the characteristics of a brand.

This professional paper is the first point at which we have tried to define the value of the ‘visual driver’ and forms the starting point for future research around their value compared to other ‘defining tools’ used by professional designers and academics.

In the following case study, it demonstrates the flexibility of this visual tool in that it can also be used to establish different aspects of a brand, such as where it currently sat before the rebrand and the old/existing/new audience, each one potentially having its own ‘visual driver’.

Case Study

In 2018 the Graphic Design degree was approached by Newcastle Society for Blind People (NSBP) to undertake a student project to improve their organisation’s Branding and Communication. The NSBP is one of the oldest charitable organisations in Newcastle, established in 1867, who’s key ethos is to promote independent living to the visually impaired.

The project had to tackle the key challenges of how to effectively communicate the charities services and values to current stakeholders and new audiences in an increasingly competitive market.

It was decided to break the project into three phases. Phase 1 would consist of a branding workshop, phase 2 would be a student brief which would sit within a second-year Graphic Design Module called ‘Collaboration and Professional Engagement within Graphic Design’. This module always contains an external brief in association with a regional or national charity, so fitted perfectly. The project would involve 48 second year students, specialising in the Branding pathway on the Graphic Design degree. Phase 3 would be the delivery and launch of a new identity and associated design collateral.

Phase 1

Costings were submitted and accepted and the branding workshop was arranged. One of the initial exercises in the workshop involved ‘visual drivers’. ‘Visual drivers’ are a simple and effective way of capturing elements of the personality of an organisation. They can also have an important role to play in creative branding workshops as a way of initiating an informed dialogue about the core values and personality traits of an organisation. In our experience, the exercise can initially be met with some skepticism but once participants become engaged in assigning these values and traits in an inclusive and relaxed setting, the dialogue can be very valuable and participants usually become very engaged in the process of ‘defining the personality of their business’. It is important for the design team to be involved in these discussions because the participatory nature of the exercise gives valuable insights into the organisation and can be the starting point for the early ideations and new directions that the brand may take.

We had several key aspects to consider with this project based on the unique requirements of working with a sight-loss and visual impairment charity. We had to change the name of the exercise to ‘personality grids’ because we were concerned that an exercise using the name ‘visual drivers’ in the title might immediately alienate some of the workshop participants who were partially sighted or completely blind. We also had to consider the practical problem of using an essentially visual exercise in this context. This was a problem we never had to consider before.

In discussion with the staff of NSBP we decided to introduce several new elements including texture instead of a colour, a music genre instead of a typeface and a type of food instead of a chair. We did this to try and involve more of the senses in the exercise, so participants would be actively engaging with a physical texture but would also be thinking about auditory representation through musical genres and also considering taste and types of food.

To address the issues that some participants might have with being unable to clearly distinguish colours and patterns on the cards due to visual impairments, we introduced a key word onto the bottom of each card which gave a brief description of the image. The text was set in a sans serif font, high contrast black on white at a large point size, making it as legible as possible. This followed the ‘Making it Clear’ guidelines laid out by ‘Action for Blind People’, another UK based charity which helps blind or partially sighted people. These guidelines were recommended to us by NSBP and gave us a very useful guide for all of the subsequent work we did with the charity.



Figure 3. The multisensory ‘personality grid’ in use during a Newcastle Society for Blind People workshop session.

The workshops involved thirteen participants and three facilitators. The participants included staff and volunteers from NSBP, long-standing supporters of the charity and service users. We divided the participants into 3 groups and one facilitator looked after a group each. We spent approximately 30 minutes on defining the ‘Personality Grids’ (Figure 3).

The results of the exercise were used to inform a general impression of the organisation’s personality as follows:

In summary:

NSBP is an approachable and friendly organisation. It is small, but strong and full of personality. Reliable, supportive and tenacious, the organisation is made up of passionate individuals who are dedicated to the goal of empowering adults with sight loss.

The team works through projects together, dividing the workload to enable individual team members to focus their expertise in response to dynamic challenges. This allows the team to achieve great things through collaboration.

The working environment is warm and welcoming, providing a safe and calm space within the city centre. Service users are engaged by the team through practical, bespoke, support that is validated by the organisations heritage and long history of providing assistance to those affected by visual impairment.

Over its long history, NSBP has adapted to change and overcome many challenges. This has caused the organisation to develop into a robust yet adaptable entity, which is well positioned to respond to an uncertain future. It is clear however, that the organisation has developed an old-fashioned image and needs to work hard to foster greater awareness within the region.

This summary was extremely useful in the next phase of the workshop which was to address the name and assess whether it was ‘fit for purpose’ or needed a rethink. The separate words within the name, Newcastle Society for Blind People, were considered and benchmarked against the findings from the previous exercises, as follows:

Newcastle: very important to keep (...*The working environment is warm and welcoming, providing a safe and calm space within the city centre*)

Society: Considered to have connotations of secrecy and being old-fashioned (...*NSBP is an approachable and friendly organisation... It is clear however, that the organisation has developed an old-fashioned image*)

Blind: could put people off who are not blind. Most service users suffer from varying degrees of sight loss and visual impairment (...*dedicated to the goal of empowering adults with sight loss... providing assistance to those affected by visual impairment...*)

People: This is a given and deemed unnecessary

A new name, Newcastle Vision Support, was proposed. This name reiterated the values defined in the ‘personality grid’ exercise and reinforced the usefulness of this exercise as a key tool in shaping the various stages of a rebrand. The name was presented to the charities board and unanimously approved. This was a significant moment, being the only name change in the organisation’s 150-year history.

Phase 2

The next stage of the project, was to take the findings and brief the students. The organisation’s leadership team visited the University and gave a presentation and discussed the issues faced by people with visual impairment and sight loss. The staff team then gave the students the brief (Figure 4) and a presentation which required them to design a new logo, a set of simple brand guidelines and other assets.

Br&ing



Module information
Level 5, Semester 1, 2016/17
20 Credits - 200hrs of Study

Module title
GD507 - Collaboration and Professional Engagement in Graphic Design

Module tutors
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BA (Hons) GRAPHIC DESIGN & BRANDING

Assignment brief

Is there anybody out there?

Introducing the professional working environment of Graphic Design

Background

Newcastle Society for Blind People (NSBP) is a small, independent charity supporting over 1,000 visually impaired people in Newcastle. NSBP formed nearly 150 years ago but its ethos remains much the same as when it was created in 1867. The organisation helps visually impaired people to be independent through information and learning activities, keeping in touch through people services, social groups and empowerment work.

NSBP is an approachable and friendly organisation. Reliable, supportive and tenacious, the organisation is made up of passionate individuals who are dedicated to the goal of empowering adults with visual impairment. The working environment is warm and welcoming, providing a safe and calm space within the city centre. Service users are engaged by the team through practical, bespoke, support that is validated by the organisations heritage and long history of providing assistance to those affected by visual impairment.

Over its long history, NSBP has adapted to change and overcome many challenges. This has caused the organisation to develop into a robust yet adaptable entity, which is well positioned to respond to an uncertain future. It is clear however, that the organisation has developed an old fashioned image and needs to work hard to foster greater awareness within the locality.

The Brief

Coinciding with NSBP's 150 year anniversary, the organisation wishes to update its name and visual identity. Your group has been tasked with rebranding NSBP and develop an identity that better reflects the organisation's personality and services. The organisation's new name has been developed in the weeks leading up to this briefing, through a workshop lead by Northumbria University and will be announced to you next week.

The majority of people being supported by NSBP are aged over 65, but they provide help to anyone aged over 18. The organisation is staffed by volunteers and paid staff. Staff wages and charitable activity is made possible by membership fees, donations, legacies and funding grants. You need to carefully consider these different audiences and NSBP's service users when developing your design solutions.

The Ask:

Develop the following:

Assets:

A Design Identity

- Logo
- Colour palette
- Typeface/typefaces
- Set of brand guidelines

Implementation:

- Website – Flat designs for Home page and several others
- Print – Leaflet and poster designs.

Study guide:

18/10

10AM - Briefing and Presentation
PM - Background research on NSBP

25/10

AM - Drop-in crits with Chris Wilson
PM - Client Presentation & name reveal with Q&A

01/11

Group Tutorials:
(All day - Following group timings)
Mike Pinkney, Chris Wilson

08/11

Group Tutorials
Mike Pinkney, Chris Wilson

15/11

Group Tutorials:
Mike Pinkney, Chris Wilson

22/11

Group Tutorials:
Mike Pinkney, Chris Wilson

29/11

Group Tutorials:
Mike Pinkney, Chris Wilson

06/12

Final Presentation to client

09/12

Final Hand-in

Location guide:

Tuesdays
SQW109 - Branding Crit Room.

Deadline/timeline:

Final presentations - Tues 6th December
Hand-in - Friday 9th December
(Time TBC).

*Group project will be submitted in one portfolio per group with one set of collated and bound research.
All work should be mounted cleanly and professionally with pdf on a USB. PDF also to be uploaded to ELP.*

How the work will be assessed:

Your work will be assessed against the following Learning Outcomes:

1. Knowledge and Understanding

Research, Experimentation And Development

Demonstrate a clear investigation of the subject.

Explore a range of techniques, principles and approaches.

Identify an effective creative approach.

Indicative Weighting – 30%

2. Intellectual Skills

Creative Solution

Understand and develop original concepts.

Communicate an appropriate solution,

demonstrating creativity and imagination.

Ensure the final outcome satisfies the demands of the brief.

Indicative Weighting – 30%

3. Practical Skills

Technical Ability And Presentation

Develop design skills and craftsmanship.

Demonstrate technical proficiency with appropriate attention to detail.

Ensure the submission has been well organised and presented.

Indicative Weighting – 30%

4. Transferable/Key Skills

Studiosity

Develop effective time management and personal commitment.

Demonstrate critical self-analysis and personal reflection.

Engage with programme and peer group.

Indicative Weighting – 10%

Figure 4. Student project brief, with the background story derived from the workshop 'personality grid' sessions earlier.

The summary findings from the initial ‘personality grid/visual driver’ exercise in the brand workshop, were included on the brief as one of the key elements which would form the basis from which the students would tackle the design of the logo and other visual material.

The students worked in teams of 4 and had approximately 6 weeks to work on the project, having one contact point with Graphic Design staff a week (Note – they had other projects running parallel to this project as well). The ‘client’, NVS, came in three times throughout the project, once to brief, to give some mid-point feedback and for final presentations. The students all visited the NVS offices and interviewed the staff working there to gather more insight.

As the students moved through the project they adhered to the following structure; Initial briefing based on findings from the brand workshop, research into NSBP, research into other charities in the sector, research into sight loss and the issues around it, leading to brand values and mission statement (as well as possible straplines). Three possible routes were then developed and one was chosen from those. This was then developed and refined into a final logo and it was demonstrated how this would be implemented across other material.

The final presentations went extremely well and the chosen logo (Figure 5) captured the essence of the organisation, it embodied two of the words used in the new name i.e. Vision (abstracted representation of an eye) and Support (abstracted representation of two elements working dynamically together).

Phase 3

After the final presentations, one approach was selected to refine the creative approach. The successful team worked on the final stage of the brief with the organisation, along with the staff team, in refining the colours, the strapline and implementing the new designs across a whole range of materials.



Figure 5. Final identity and example execution.

Conclusion

The experience gained over the last few years implementing the ‘visual driver’ within our curriculum and more recently with the case study from the Newcastle Vision Support (NVS) charity demonstrated the inherent fluid values of the ‘visual driver’.

Within our Graphic Design degree, it has enabled us to fully embrace the tool within the curriculum. Our students also trust in the ‘visual driver’ as an integral part of their own creative process in branding focused projects. As Lucero and Martens state they can capture the ‘atmosphere of experiences’ by means of photographs or other expressive aids (Lucero and Martens, 2006).

This paper has uniquely highlighted the innovative, yet deceptively simple creative rubric in use on a Graphic Design degree and how the onset of multisensory branding can be given a value within the ‘visual driver’ format.

As a participatory tool its success is judged by the fact that you don’t have to be a designer to understand it and more importantly, to engage with it. By its inclusive nature it can interrupt current thinking, and the facilitators or designers can swap in/swap out additional sensory elements if needed. It is this flexing in the creative process that harbors a strong sense of ownership amongst the participants.

To quote Robert Burns, even the ‘best laid schemes’ can go askew, and in the case with NVS that demanded particular modifications, our relationship with the ‘visual driver’ deepened our understanding of this highly flexible, inclusive and accessible tool.

Acknowledgments

The authors would wish to thank, the organisations that have helped shape this research, namely, Newcastle Society for Blind People (NSBP) / now Newcastle Vision Support (NVS) and Christopher Wilson, Senior Lecturer in Graphic Design.

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11. Creative Industries & Design Provocations

The challenges of sustainable entrepreneurship are manifold, especially for the commercialisation of good product and service ideas. How can creative production offer livelihoods in the times of AI and novel technologies? What are the lessons learnt in bridging product-service design and commercialisation journeys? Practitioners and researchers are invited to submit presentations and papers that investigate the challenges of sustainable entrepreneurship in creative industries.

Academic Papers

Experience design: The impact of team composition and interaction on creative output

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Abstract

The world has progressed from a manufacturing economy to a service economy, and to now an experience economy. The smartphone we are using now and the experience it provides to us make a big difference to our life when compared to what we had in the old days. Experience design takes the users' cognitive and emotional needs as its starting point and redefines the functionality, meaning and value of products, services and systems, strategically transforming them into highly integrated ecosystems capable of enhancing the sustainability and humaneness of our social and economic environments, while offering industries a competitive edge. Experience design entrepreneurship today increasingly relies on the use of teams to generate creative ideas because such teams promote synergies that can result in the production of ideas that members could not have generated individually. Therefore, understanding about how team composition (i.e. the combination of individual attributes) and team interaction (i.e. the process of social interaction) affect creative performance is vital for sustainable entrepreneurship. A pertinent question thus is: which types of team composition and team interaction process can influence the creative output quality of experience design teams? Extant studies on team performance can be classified into two streams. The stream on team composition posits that heterogeneous teams benefit from the range of skills possessed by their members and exhibit better problem-solving. The other stream focuses on the impact of social interaction on team performance. The tenet is that teams serve as unique social settings in which interaction among team members may be a major contributor to the quality of team creativity, which can influence the subsequent project performance. This research involving 45 experience design teams shows that three individual attributes, namely neuroticism, openness and creativity, correlate negatively with two team level variables, namely team cohesiveness and support for innovation. The interaction of these individual attributes and team interaction factors in turn leads to positive creative performance of teams. The results also suggest that individual creativity best predicts the creative output quality of a team. Implications for future research are then discussed.

Keywords

Experience design; team composition; team interaction; creative output.

Experience design

Over the past few decades, the world has progressed from a manufacturing economy to a service economy, and to now an experience economy (Argenton 2015; Correia Loureiro 2014; Degen et al. 2017; Dieck et al. 2018; Lupton 2014; Gibbs and Holloway 2018; Manthiou et al. 2014; Meghna et al. 2016; Pine and Gilmore 1998, 1999). The smartphone we are using now and the experience it provides to us make a big difference to our life when compared to what we had in the old days. There is a growing awareness in the recent decade about designing for experience and the human, social and economic benefits that it can bring to nations and organisations. Experience design takes the users' cognitive and emotional needs as its starting point and redefines the functionality, meaning and value of products, services and systems, strategically transforming them into highly integrated ecosystems capable of enhancing the sustainability and humaneness of our social and economic environments, while offering industries a competitive edge. It is the process of enhancing users' trust, satisfaction and recognition of a product, service or system by improving the users' perception of the innovativeness, aesthetics and relevance of the experience provided in the interaction between the users and the product, service or system's design elements in a context (Cheung 2016).

Google's Google Search, Google Maps and YouTube are illustrative of how intrinsic to our daily lives innovative experience designs have become. Tencent has its WeChat platform able to support location-based social plug-ins, allowing users to befriend and chat with nearby strangers through a simple shake of their smartphones. These types of experience design systems did not exist in the pre-digital era and are now the focus of creative design. Alibaba's Tmall and Taobao implement technology-enabled forms of electronic payment security, product quality assurance and online dispute resolution to combat user distrust of online purchases. The success of these companies stems from the experience design strategies that they use, in which users are reached and connected through different touchpoints relevant to their socio-cultural contexts. The sustainability of the experience design ecosystems also relies on involving the users in exchanging value in ways that are mutually beneficial socially, economically and technologically over time. For example, Amazon, eBay and Taobao provide user-friendly interfaces that have enabled their users to create a new wave of small businesses and online-to-offline services on their platforms.

Experience design entrepreneurship

Experience design entrepreneurship today increasingly thrives on the use of teams to generate creative ideas because such teams promote synergies that can result in the production of ideas that members could not have generated individually. Therefore, understanding about how team composition (i.e. the combination of individual attributes) and team interaction (i.e. the process of

social interaction) could affect a team's creative output quality is vital for sustainable entrepreneurship.

Studies on team performance can be classified into two streams. The stream on team composition posits that heterogeneous teams benefit from the range of knowledge and skills possessed by their members and exhibit better problem-solving (Christensen and Ball 2016; Nissen et al. 2014). Moreover, when teams are composed of people from collectivist cultures, members display more cooperative behaviour than when teams are composed of people from individualistic cultures (Cox et al. 1991). The other stream focuses on the impact of a team's social interaction on creative performance. The tenet is that teams serve as unique social settings in which interaction among team members may be a major contributor to the quality of team creativity (Jiang et al. 2018; Ni et al. 2018; Woodman et al. 1993; Wu et al. 2017), which can influence the subsequent project performance. This study assesses the impact of team composition and team interaction on the creative output quality of experience design teams.

Team composition

This study focuses on three individual attributes, namely neuroticism, openness and creativity, that might exert an influence on a team's project output performance. Neuroticism is a measure of an individual's degree of calmness and security (Barrick and Mount 1991). Neurotic individuals are primarily characterised by a tendency to experience negative affective states. They tend to be more hostile and less able to control their impulses than more emotionally stable individuals (Costa and McCrae 1992; Gelade 1997). They might therefore undermine the social fabric of teams (Haythorn 1953).

Individuals with an open personality are broadminded, curious, imaginative, original and untraditional (Costa and McCrae 1992; McCrae 1987). These individuals are not only characterised by a need to seek out unfamiliar situations that allow for greater access to new experiences and perspectives, but also by a permeable structure of consciousness that allows for better absorption and combination of new and unrelated information (McCrae and Costa 1997). Studies have established a link between openness and a team's interaction processes. Teams with a higher level of mean openness exhibit less social loafing because they find the brainstorming task intrinsically motivating (Bond and Shui 1997). Conversely, teams that are narrow-minded possess little motivation to be creative (McCrae 1987). With greater access to varied perspectives and an enhanced ability to absorb and combine new and unrelated information, open-minded individuals could be more effective in both the generation and cross-fertilisation of ideas (Buchanan 1998; Chirumbolo et al. 2005; Conway 1967).

Creative abilities are often regarded as the paramount requirement for a design professional (Otnes et al. 1995). Creativity in design is about both quantity and quality of ideas. On the one hand, a design project usually involves the working out of a wide variety of relevant responses to solve a problem (Batra et al. 1996). It requires a team member to have "the ability to take different approaches to a problem, think of ideas in different categories, or view a situation from several perspectives" (Davis and Rimm 1994, p. 189). On the other, creativity is judged not only by how imaginative a team

member's ideas are with regard to the client's task requirements, but also by how innovatively he or she can execute that idea through the selection and integration of materials, media and forms (Cheung 2012).

Team Interaction

While team composition is important, the process of team interaction can be critical as well. In this study, we focus on two factors that might influence a team's creative performance, i.e., team cohesiveness and support for innovation. Team cohesiveness is a team's shared commitment or attraction to the task or goal (Goodman et al. 1987; Hackman 1976). It is the sum of forces acting on team members that ensures their contributions to the team, such as cooperation, mutual psychological support, interpersonal attraction, commitment to the task and team pride. Meta-analyses of empirical studies show that team cohesiveness can be an important contributor to effective team performance (Evans and Dion 1991).

Support among team members may also exert a powerful influence in shaping a team's creative performance (Brown 2000; Hackman 1992). Support for innovation is defined as the expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment (West 1990). Creativity can be more likely to flourish in contexts, whether organisational or team, in which there is support for innovation or innovative attempts are rewarded rather than punished (Amabile 1983; Kanter 1992).

Research approach

This study takes on an input-process-output approach to examine the impact of team composition (neuroticism, openness and creativity) and team interaction (team cohesiveness and support for innovation) on the project performance (quality of creative output) of experience design teams. A total of 180 young professionals, aged between 22-30, were recruited to participate in this study. The participants were randomly grouped into 45 teams, with each team of four including two males and two females and comprising an experiential tourism consultant, a food and beverage specialist, an event organiser, and an information designer. The study consisted of three tasks, and each team completed the same tasks in a studio setting within a three-hour timeframe.

Task 1: Each participant completed a questionnaire aiming to measure his or her individual attributes of neuroticism, openness and creativity. Demographic information such as gender, age, educational background, occupation and years of work experience was also collected.

Task 2: Each team received a project brief, which described the experience design project they needed to accomplish. The brief required them to create a mobile application which could enable an innovative online-to-offline experience for guiding tourists to explore the local food and beverage culture. The deliverable would be a 20-frame concept board visualising the experience that the team would create through the mobile application. And the interaction process of each team was video-recorded.

Task 3: After completing the experience design task, each participant was asked to fill out another questionnaire which aimed to capture his or her opinions about the team interaction process with regard to team cohesiveness and support for innovation.

After the above had been concluded, the creative outputs produced by the 45 teams were passed onto ten accomplished experience design directors to evaluate for quality in terms of concept, relevancy and creativity.

Results and discussion

Analysis of the research data shows that the three team composition variables (neuroticism, openness and creativity) correlate negatively with the two team interaction variables (team cohesiveness and support for innovation). The interaction of these team composition variables and team interaction variables in turn leads to positive creative performance of teams. Neuroticism is found to correlate negatively with team cohesiveness ($r = -.36$, $p <.05$) and support for innovation ($r = -.36$, $p <.05$), suggesting that team cohesiveness and support for innovation may diminish with increasing neuroticism of team members. Yet out of our expectation, openness also appears to correlate negatively with variables at team interaction level: team cohesiveness ($r = -.38$, $p <.01$) and support for innovation ($r = -.39$, $p <.01$). Similar to openness, individual creativity also negatively correlates with both team cohesiveness ($r = -.40$, $p <.01$) and support for innovation ($r = -.41$, $p <.01$). Yet the overall creative performance is found to significantly and positively correlate with the two team interaction variables, with $r = .37$, $p <.05$ for team cohesiveness and $r = .41$, $p <.05$ for support for innovation.

A regression analysis then shows that the three team composition variables emerge as significant predictors of team cohesiveness, with neuroticism at $\beta = -.40$, $R^2 = .13$, $p <.05$, openness at $\beta = -.48$, $R^2 = .15$, $p <.01$, and creativity at $\beta = -.40$, $R^2 = .16$, $p <.01$. The individual attributes are also significant predictors for support for innovation, with neuroticism at $\beta = -.40$, $R^2 = .13$, $p <.05$, openness at $\beta = -.49$, $R^2 = .15$, $p <.01$, and creativity at $\beta = -.41$, $R^2 = .17$, $p <.01$. Specifically, individual creativity emerges as the most outstanding predictor for both team cohesiveness and support for innovation, accounting for substantial variance of 16% and 17% respectively. The two team interaction variables also explain considerable variance in the overall creative performance, with team cohesiveness at $\beta = .39$, $R^2 = .13$, $p <.05$ and support for innovation at $\beta = .36$, $R^2 = .12$, $p <.05$ showing positive variance.

The results indicate that teams high in neuroticism showed lower degree of team cohesiveness and support for innovation. Teams possessing a lower level of neuroticism were more likely to experience positive intra-group interactions and thereby become socially cohesive. And the videos of team interaction show that teams which were highly stable in emotions were more likely to provide candid feedback which could stimulate idea generation processes or cause members to further elaborate their ideas. This in turn enhanced the teams' capability to excel in terms of creative performance. On the other hand, neurotic members tended to provide more feedback to their team members, but the feedback was neither of appropriate magnitude (e.g. too many task-related disputes or too harsh in criticism) nor offered at appropriate moments

(e.g. too early in the process). Overall, teams low in neuroticism delivered outputs of better quality than neurotic teams.

The results also show that openness was found to predict team cohesiveness and support for innovation, as well as creative performance. Yet teams with a low level of openness tended to be more cohesive and provide more support for innovation. The videos of team interaction provide an answer to this unexpected finding. They suggest that excessive provision of irrelevant information by open individuals could hinder a team's creative processes.

Creativity was found to negatively correlate with the team interaction variables. This suggests that teams comprising a majority of highly creative individuals might have difficulties in reaching a convergence in creative ideas, and thereby weakening team cohesiveness. In addition, the finding of a high level of mean creativity resulting in a low level of support for innovation means that there could be a lack of peer support by creative individuals to other team members.

In this study, team cohesiveness and support for innovation are positively correlated to a team's creative output quality. This suggests that when team members worked well together, then the harmony and synergy among them could encourage mutual support and create a positive atmosphere for collaboration to flourish, which then boosted the team's creative performance.

The results also suggest that individual creativity best predicts the quality of a team's creative output. As revealed in the videos of interaction process, individual creativity could be more important in the initial stage in determining the quantity and quality of ideas available from the pool of individual innovativeness. At a later stage, team cohesiveness and support for innovation could become more important in either facilitating or hindering the expression and development of ideas through articulated and enacted support from team members, as well as the cohesion established among them. Thus the contribution of team interaction factors might vary at different stages of a creative process.

Implications and conclusion

Experience design innovation is fundamentally altering the way in which products, services and systems are designed and operated. It changes the nature and environments of physical artefacts by integrating digital systems and resources with the physical world. Information and applications have become critical components of the functionality of an array of physical products and systems, including personal devices, home appliances, retail, transportation, healthcare systems and public facilities, among others. Experience design in this context presupposes new ways of co-creating value through resource integration underpinned by interdisciplinary coordination and team collaboration that is informed by advanced research and development, design and technological capabilities as well as adaptability and personalisation (Cheung 2016).

The implications of this study are two-fold. First, this study adds to the experience design creativity literature by providing insights into how individual attributes can affect vital team interaction in terms of cohesiveness and

support for innovation, which can ultimately impact on a team's creative output quality. This research shows that three individual attributes, namely neuroticism, openness and creativity, correlate negatively with two team level variables, namely, team cohesiveness and support for innovation. The interaction of these individual attributes and team level factors in turn leads to positive creative performance of teams. From a practical perspective, this study can provide experience design team leaders with a more informed idea about the team composition they shall consider. To generate greater benefits in experience design entrepreneurship, the teams shall best be composed of individuals with not only appropriate creative traits but also cohesive personality so that they can be supportive to other team members. Indeed, composing teams with members of high neuroticism, high openness and high creativity may add little benefits or even be harmful to team interaction processes and creative performance.

Second, building on this study, the evaluation data set created by experience design directors can be augmented with future data collected from consumers exposed to the experience design outputs. This can lead to a more comprehensive, multi-perspective study. This study can also provide the ground for future research into a few areas, including but not limited to: the ethnographic context and shared vision in addition to psychological assets of an experience design team, the types and causes of conflict that may develop in such a team setting, and the effective approaches and best practices to engage members from different disciplinary backgrounds in an experience design project.

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Planning Organization Design Thinking as a Way of Diversification Strategy

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Abstract

As the ultimate formation of entrepreneurial development, diversification strategy is broadly adopted for increasing interest and lowering risks. However, actual businesses avoided mentioning details or methods of the diversification strategy, while researches around it became white-hot. Behind such bizarre phenomena lies the understanding of confusion of diversification strategy. The context of diversification strategy should be shaping the future, rather than expanding existing advantage. The author hypothesized three hierarchies for re-understanding diversification strategy, among which, purposes of planning diversification strategies can conclude as a way of investment, competition or design thinking. Innovative diversification strategy aims at innovation and exploring humanity. This strategy hierarchy is considered as an inquiry for solving the wicked organizational problem, which cannot be solved without organization design thinking. This organization inquiry over reformative level requires to clarify the intentions of business and enterprise itself, as wicked problems have no stopping rules. The case study on a coating company is a successful example of how organization design thinking might involve into actual diversification strategy. Both the management cancellation of the human resource department and the majority of salary through the indoor tender system are innovative organization design results, which might provide positive support for how organization design thinking promotes diversification strategy planning.

Author keywords

Design Thinking; Diversification Strategy; Organization Design; Inquiry;
knowledge and learning system

Introduction

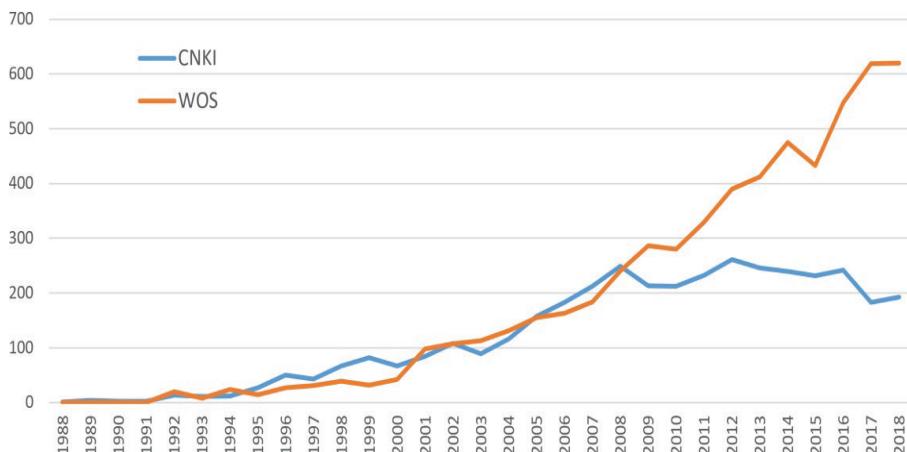


Figure 1. Trends of academic publications of “diversification strategy” on WebofScience and CNKI.net

Image 1 (data on 2018-12-19) illustrated the surge of academic focus on the topic *diversification strategy* in both WebofScience and CNKI.net (Chinese largest academic publishing platform).

Diversification Strategy seems to win universal praise in innovative industries, especially those multidiscipline-based high technology companies. Would it be at the golden age or just a booming bubble? The context of the diversification strategy in academic research differs for multiple purposes. Taking a deeper look at those researches, the real question that refers to plan a particular diversification strategy itself is rarely found. Most of the research take diversification strategies as either proper reasons for confirming existing achievements or quantize diversification strategies as some indexes for proving the very existence. The summaries of those diversification strategy studies are unimaginably universal. Phrase diversification strategy is used as an immortal elixir to cure every disease of the company.

Is this magic word still powerful while facing real business problems? If we collect keynotes of those world known CEOs (Chief Executive Officer) or VPs (Vice President, refers to top managerial members), it is clear that over a half have yelled their slogan of adopting diversification strategy. Probably, even the mightiest companies would face tackle problems on their trail of competitions and developments (Ghemawat 2002), and indeed diversification strategy is a common and effective method to break through the bottleneck of a solo industry. Why the majority of those companies which exclaimed diversification strategy without any unique details? Are they thinking diversification strategy as a tool/method (Kiechel 2010), or a problem, or just an issue?

Why the evidence never appeared in actual business services or consultancies? There might be some possibility that these CEOs/VPs had to keep confidential for trading secrets, but not every one of them should keep silence. To unveil such suspicions, the author conducted an indifferent survey of VP level entrepreneurs in mainland China by the author through online questionnaires in June 2018. According to the valid replies, 70% of the invested who confirmed the existence of recent diversification development of their companies. However, only 5% of them might clear about the whole diversification strategy details in their minds. As a weird contrast, 55% of them recognized their application of other traditional business strategies, such as "the stages of planning" (Deimler 1981), or BCG's Competitive Advantage Matrix (Porter 2006).

Also, by collecting the subjective replies of the survey, some of those CEOs/VPs doubt that diversification strategy involves too many details from all aspects of the companies, especially the whole organization cannot clarify the reformation within a few words. They handled these implicit issues by improvising, which would only be known when matters expose themselves. In a well-organized strategy, every move should be explicit for the organization to execute and achieve fabulous breakthroughs. Such a description seems conflicting against this criterion.

The context of speaking "diversification strategy"

It is clear that planning or conduction is strongly related to the context of the diversification strategy, by collecting all related descriptions in the interview. Procedures of *diversification strategy* are often transparent when talking *diversification strategy* as a kind of circumstance situation or business model. As a contrast, *diversification strategy* seems dingy while an immediate decision is about to make. They admit the positive effect of *diversification strategy* as creating something different and new, but lacking the faith of invincibility or robust that should be.

In tradition, the diversification strategy often acknowledged under Ansoff's description. *A corporate strategy to enter into a new market or industry in which the business doesn't currently operate, while also creating a new product for that new market* (Ansoff 1957). The emphasis on *doesn't currently operate* often seen, while the very requirement of *an exploration into an unacquainted territory* is missing, as most of the public understanding focused only on the *new market plus new product*.

This situation kept aggravating while the age of the Internet and socialized networks come. The innovation of new products, services or experience drastically expand the consummation market. As information value converging around those giant companies, reengineering of opponents become critical resolutions for breakthrough and occupying new markets.

These decisions are somehow far away from diversification strategies. Freedman (2013) illustrated the definition of business strategy as to formulate and implement primary objectives while conducting initiatives through top-level management of an enterprise, with considerations and balancing between resources and assessments of both internal and external competing

environments (Rajiv, Hambrick and Chen 2007). These decisions (Porter 1996) focused only on competition (Porter 1985), notwithstanding exploration into an unacquainted territory. In other word, the ultimate pursuit of innovation for revolutionary creation of chasing social value and entrepreneurial opportunity is therefore replaced by expanding ones' competitions of existing business processes through existing advantages.

Another reason is the confusion between business model and strategy (Chesbrough 2010), which leads to the fuzziness of the diversification strategy definition. The boundary of these two is the tendency of focusing more on value creation or competition (Elliot 2002), though in actual business activities, these two are overlapped quite often interdependent and inalienable (Magretta 2002). Value creation under this context means to understand the fundamental requirement of social development and technological revolution (David 1992), exploring, formulating and developing a systemized doctrine that can assure future success with faith and believes (Kvint 2009). Mekeown (2011) demonstrated the business strategy for the diversified process with a more powerful phrase: *shaping the future, or desirable ends with available means*. Only through this context could a diversification strategy ensure its sustainability and clearance of long-term vision.

Re-understand hierarchies of diversification strategy

Innovation is totally different from making something new, as development is acknowledged as advancing or education. The real innovation of diversification strategy requests seeing technology or other advancing as border art of thought and communication (Buchanan and Margolin 1985). Best planning forges bridge to communicate the emotion and esthetics of lifestyle, with pleasure argument of mind, then forms an impregnable bundle for foreseeing the future.

The real innovation of diversification strategy requests seeing technology or other advancing as border art of thought and communication (Buchanan and Margolin 1985). Best planning forges bridge to communicate the emotion and esthetics of lifestyle, with pleasure argument of mind, then forms an impregnable bundle for foreseeing the future.

Diversification strategy as fact, symbol or signal

The start lines of diversification strategy are drawn by rivals. Declination of market occupation or profit percentage, loss of currency or user traffic, shifting of social consensus or intention, all of these present the signs for a fundamental revolution of business model or strategy.

On the other hand, declaring the application of "diversification strategy" can release a signal back to the business circle, promoting attention through the attitude of demonstration. Diversification strategy is adopted not as full-scale planning but a rescue analeptic to an exhausted predicament. The theme of diversification strategy symbolized the best reason for emphasizing enterprise assessment rather than value creation made by them. That can explain why "the adaptation of diversification strategy" is frequently mentioned in launch events or presentations without any detail provided.

These understandings of diversification strategy trapped in the Data Hierarchy, that description of a particular sentence keeps the same from entrepreneurs to entrepreneurs. Such declarations might sometimes create economic values to the company, but hardly any social meaning to customers. Having a decision instead of making a strategy solves no problems, but evading questions.

Diversification strategy as structure, function or relation

Acquisitions and mergers are the most common ways of conducting diversification, covering from purchasing a new raw material to acquiring a whole company. People claimed such combinations as creations, while these are merely connections or relations. Adoption of these new elements might be involved in structural or functional adjustments. However purchasing, on its very essence, is not the transformation but a transaction of existing values between different hands.

These understandings of diversification strategy promoting progress, yet still being restricted in the Information Hierarchy. A large number of events observed that a single enterprise with surplus capital sprout a mimicking division from rivals, but declare their original ecology through flickering illusions. The fundamental characteristic of these diversification strategies is that several nova newcomers might become parvenus, while the total amount of the particular market keeps unchanged.

Academicians shall not blame those enterprises, as the essence of business is always defined as profiting. However, we are still looking for new understandings and methods to breakthrough this zero-sum game, with further believes and thinking.

Diversification strategy as organization, meaning or intention (Tsoukas & Chia 2002)

Greatest business innovations revolute the ways of lifestyles and thinking, providing new meanings to fine art and aesthetics. Behind the surging of interest and market, the intention of entrepreneurs matters. This intention requires insights into future life through inquiry (Dewey 1953), as individual needs synchronize. Advanced technology might solve a general problem, but it cannot answer the question of what is the next possibility.

Perceptions of innovation differ between business decision-makers and not only users but also employees. A simple technology might understand as advancing of physical realization, or as rhetorical decoration, confusing fundamental needs with luxuriant appearing. Business signals and processes pass within different members of the company in steps, while intentions are commonly divergent. Receiving and deciphering purpose from others inevitably involved in one's own experience and cognition, lead to a higher system level deviation, which might change the situation into organization wicked problems (Dewey 1953).

The concept *organization* in this context should distinguish from the concepts of *organizing* or *organizational*. It should be seen as a changing, developing and living system (Buchanan & Margolin 1985) of a whole, rather than single elements or compounds. The design of diversification strategy is not a simple decision making with everything known, but an intuition connected to the inquiry for exploring humanity and perfection. In other words, the organization itself is the very objective of design thinking all through the whole diversification transformation. (Cagan and Vogel 2002)

Organization design thinking for the diversification strategy

Design thinking for diversification strategy is forever complicated to do than to say. Wicked problems commonly found when handling with bounded rational cases for product or service design. When it comes to enterprise, levels of wicked problems exemplified even worse. People in related professions are so talented and competent that they represent the collective with their intentions.

The explorations and applications of design thinking into actual businesses have a long history. At the beginning of the internet booming, interaction design is dominant. Customers are facing products focusing on information and function issues, which they have to handle in rations. Cagan and Vogel (2008) mentioned that even for a simple product, designers have to confront different levels of diversified technologies. When the market shifts to service-based industries, more conflicts appear. Boland et al. (2014) suggested the heritage deviations of design attitude into closure in business design problems might limit the possibilities of functionalities in all aspects of one organization. Heskett and Dilnot (2015) refer this deviation to lack backbone of value creation in knowledge-economy age (Amidon Formica and Mercier-Laurent 2005), as not only proper knowledge but also negative emotions and attitudes are spreading. If this deviation heritage lasts, it might sabotage not only existing diversification business model but also design legacy, that every participant in this game keeps chasing easy solution instead of innovation and reformation. More researches also showed the evolvement of organization design thinking (Junginger 2015) for diversification strategy from static element calculation to the dynamic pattern of thinking.

As understanding deepens, the kernel issue rises that a proper method to conduct organization design thinking is missing, though reasons and importance of organization applying design thinking for diversification strategy are clear. Real innovative diversification strategy creates a bright future out of presence, which requests striding beyond existing experiences (Dewey 1953). The presence in this context shall recognize as an undetermined issue, not a glorious achievement. Possibilities of diversification are forever more than one, but how actuality transformed into potentiality is never a single step, but unremitting attempting and challenging.

Organization as knowledge and learning system

Organization design research can be traced back to enterprise re-engineering researches, which aimed at reviewing customer opinions and demands, then

overturning design from traditional objective management targets like production progress (Hammer 1993). These researches annihilate limitations of team managerial duties, encouraging breakthrough of team task mode instead of obsolete process rules. Based from Hammer's view, two majority ideas of organization designs for entrepreneurial innovations have proposed: (1) Radical organization change (Newman 2000), which focuses on continuous recognition of external environment development to push structural and managerial level innovation. (2) Extension of institutional theory (Amenta & Ramsey 2009), which holds the opposite idea that enterprises will be further trapped with institutional revolution if more focusing is on matching external environments.

Radical organization change theory plays critical roles at the beginning of the new century, as decentration (Siggelkow and Levinthal 2003), unformal division effect (Gulati and Puranam 2009) and interdependency (Puranam, Raveendran and Knudsen 2010, Srikanth and Puranam 2011) of outer resources (business partner and intelligence) matches this fast position alternation age. These theories often played well in newly established or growing companies, but somehow get pickled in a diversification strategy. Smaller companies incline their balance to drastically change (Gersick 1991), while diversified ones still have to maintain the majority portion of their traditional businesses (Grossmann 2003). The confliction between new and original divisions and kernel individuals that finally leads to general failure frequently reported.

The mismatch of organization and business innovation, according to Tsoukas (2002), is to treat organization not as change itself, but a passive inner environment. The nature of change is the process of exploring inquiry (Schumpeter 2012), to recognize the organization as the knowledge and learning system (Tsoukas 2002). Creation, diffusion, and transformation of pragmatic knowledge (Schumpeter 1994) is an ultimate dynamic to drive the business ahead, instead of stability maintenance or sequential progress. Organization inquiry, to its best, should be conducted through design thinking (Boland 2004), which in particular requests (Ford 2008): a) the initiative of change instead of description about targets. b) Unlike information or data, knowledge requires a certain period to diffuse or transform, and might distort without noticing. c) How to reverse resistance into dynamics from an organization agent. Based on these hypotheses, Smith (2011) furthered organization design method by combining both the positive environmental meaning of radical organizational change and organization design based on knowledge system, then verified the idea through multiple case studies. Smart leaders with inquiry thoughts, proper entitlement, and personal authority might participate in pillar effects. More academic theses about diversification strategies within the recent five years are now focusing on why the organization exists rather than how an organization played.

A case study on an innovative coating company

The authors interviewed a world-leading coating company (2015-2018), to verify our understanding. The hypothesis is to: (a) analysis the kernel dynamics of a new diversified division of this coating companies; (b) how kernel entrepreneurs solve the wicked problems appeared in the realizing process of their diversification strategies; (c) to testify if organization design thinking could participate its help to clarify and tackle knowledge conflicts.

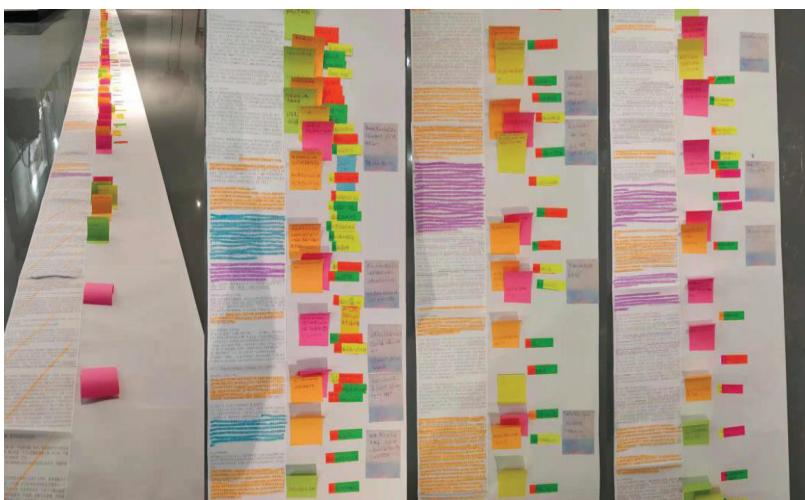


Figure. 2 Raw records and three round analysis of survey over six technological innovation companies, including the coating innovative company.

Wondercoating (pseudonym for the confidential reason) is the world leading international coating producing company, with shareholders from several countries. Her business covers over 80% of modern digital product types globally. Almost every famous internet or digital technology company within the global top 500 is her loyal customer.

The aspiration of detail exhibition, stain resistance, aging resistance, fingerprint proof, tactile impression, bio-affinity, electromagnetic characteristic, hygienist, and material quality kept surging to chase the fashion, as the personal digital mobile device has much higher physical contact frequency. Coating products on the digital market (Wondercoating calls it as the mobile market) therefore revolute much faster than traditional coating (which applies to decoration, furniture or other traditional housing electronics), requests R&D (research and development) cycle of 3-6 months (doubled frequency than digital product iterations). This rapid changing requires a much faster response, compared with traditional markets.

In the second half of 2015, a new coating recipe demo named “self-recovery” occasionally invented. From the engineering point of view, the “self-recovery” coating is the most astonishing invention ever in Wondercoating’s history. This coating gradually rebounds back by its marvel elasticity and absorbing surrounding heat, after small cutting wound. The dent will visually disappear in front of the naked eyes within 20 minutes in summer temperature. Such innovation quickly aroused the intense interest of the board.

After the approval, a special team instituted, by collecting members once cooperated before of one former successful recipe, and everything seemed fine. After spent a large portion of funding to R&D, Wondercoating finally won multiple annual awards and uniform praise in the Chinese coating industry. Somehow for

the next whole year, “self-recovery” coating faced its Waterloo that dealt almost zero mass production orders.

Such unexpected results aroused the attention of administrators. Later on, a united investigation team has established, made up of elites from various divisions. The team conducted serious interviews and consensus for several rounds. According to their most familiar customers and distributors, over a half doubted the same question: why you provide us a “self-recovery” coating, but not an invincible protector that never gets wounded.

The reason led to such failure is from not “self-recovery” coating’s performance or marketing but the fundamental understanding of consummation knowledge. The next question is why this project approved since the mismatch to the market should discover in the first step. The investigation team checked the administrator records and processes and confirmed that this R&D decision is not made simply by one dictator, but voted by the majority of the R&D section for several rounds. In each round, specific numbers of team members collected demo comments from both inside and outside of the company. Also, they found a complete recording package of the whole market exploration, in which this preference statistically calculated while several R&D section members solicited potential demanders’ suggestions after shown the miracle physical performance of primitive staged coating demos. The administrators should blame no one for the final failure, who got more confused.

The board fined the whole R&D team a large portion of salaries, and several kernel members resigned from the department by complaining about the improper mismatch between their expertise and positions. The quarrel during the resignations exposed the real reason: most of the R&D interview team were staffs that reassigned from automobile R&D or marketing sections. Therefore they recollected their questionnaires from senior staff of not digital but automobile industries. When these members reassigned into the R&D section at the beginning, they found themselves perplexed to immediately start the indoor R&D work, while the rest veterans, who already got exhausted of product iterations under three-month circulation, are too busy to join the interviews. The traditional culture of R&D sections required the newcomers to “get their shoes wet first”.

Another critical cognitive blindness discovered, by contrasting different knowledge of two industries. Slight scuffing of paint surface might in some way arouse visual discomfort, therefore “self-recovery” coating might solve the problem better. A scratch would despoil the finishing experience of a digital product under closer looks. The recovery time that counts on minutes would be too long to endure. The experiencing acknowledge of two diverse user environments differs from each other, somehow all the section members neglected and committed the howler.

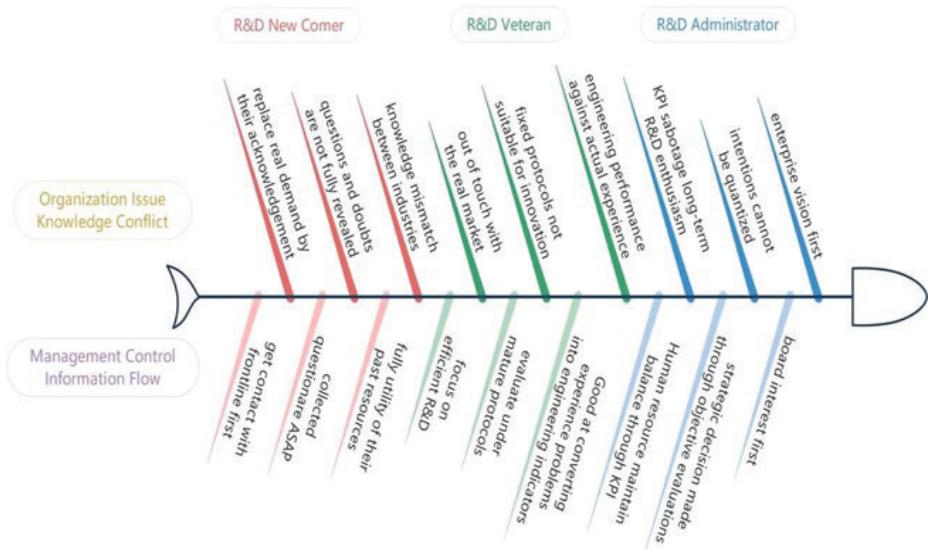


Figure. 3 Analysis of Organization Issue VS Management Control

The transmission of knowledge for exploring diversification often went wrong, while the information level channeling among management, administration, and process of this organization kept stable as always. Same actions might be driven by divergent courses (Simon 1996). After weeks of fierce discussion and debating, CEOs of this company finally admitted that this implicit failure would probably reappear without a deep organization level change.

Organization design project therefore proved. The core idea is to establish a fully independent and innovative R&D laboratory. The company reassigned almost 80% of the top elites from all other departments into this lab, aiming at the long runs. Time limitation of new product iteration has been canceled, for longer-term (estimated for an average period of 2-3 years) subversive innovations. The senior engineers of material or chemistry are required to join marketing events, while investigators are required to participate as resident supervisor of manufacturing. All members of the new lab are required to summarize their ideas and discoveries, sharing on a large publication board every weekend for discussions and comments.

Later on, a crisis burst out between the human resource manager and lab elites. Human resource department claimed that salaries and rewards were too difficult to calculate. Wondercoating formerly rewards the contribution of every staff with a series of performance indexes, including both subjective aspects (like appreciation of administrators) and objective indexes (like sales records and profit rates). The former regulations have indefinitely suspended after several rounds of negotiation breakdowns. Such divergence ignites almost every corner of this diversification strategy planning, that staff no longer devote their passion and enthusiasm of the company's visions, commencing their resignations from the lab, and finally leads to the quarrel between the VP of R&D and the board chairman.

Luckily the crisis subsided when the VP and chairman occasionally attend the forum of trend transformation 2016 (Xin 2016). Several academicians lectured their opinions on how organization design thinking might promote contemporary innovative strategies. Administrators of Wondercoating decided together to introduce organization design thinking, inviting design thinking consultancies participating over several rounds to tackle the wicked problems for diversification strategy. Main obstacles can conclude into three aspects: (a) clarifying executable mission and vision of the company, (b) new culture and management of innovation, especially compensation of salary, (c) new way of exploring the market.

Both direction and exploration of the market are soon done through co-creation and design thinking, as 15% of the staffs are from design disciplines, and another 22% has attended relative design thinking studios or workshops before. All R&D staffs reached an agreement to innovate naturally multiple-perceptual and environment-friendly coating ingredients. They developed series of Nova products like "Babyskin" (a high antifouling and smooth coating with tactility similar to baby skin), "Imitation Wood" (coating series that simulating rosewoods from appearing, texturing, touching and smelling, that 90% of customers mistook them as the real ones), "Icy Resin" (organic coatings with appearing and high heat conduction similar to Aluminium alloys), and "Eave" (electromagnetic shielding coatings to protect mobile chips). All these new products are developed by inviting participants outside the company to join workshops, determines and reviews, that leading market for five years ahead opponents.

New management becomes the most tackle problems. The laboratory intended to reassigning the most talent and excellent staff all through the company. Somehow, this laboratory might consume a lot without a profit within two or three years at least. The funding accumulated within the past years was just abundant for covering the R&D costs only. The salary system, therefore, became the storm eye. Best staff would rather stay in the original position to maintain a high income than being reassigned to the unclear future in the new lab. The human resource department opposed to give-up performance appraisal system, as three years latency would be too long to spoil the balances between original departments and the new laboratory.

The reforming group is established to visit several most innovative strategic partner companies, under the advice of some design consultants from different agencies. One small dealer company attracted their attention. The boss of one child chair and stroller distributor, also as one of the supporters of "Babyskin" coating, introduced his idea, who concentrated markets on medium income rural parents. The boss officially hires zero designers. Somehow, he recollected the eliminated design manuscripts from designers of the biggest children chair and stroller companies. He bought them with a confidential agreement of share out bonuses under his professional supervision and judgments. The negotiable reward consisted of initial buy-out plus sell shares.

An ultimate solution has been made, after rounds of mind storming and debating. The board approved the high autonomy power of this innovative lab, which allowed the lab itself made a new personnel system proposal, independently evaluate efforts from existing constitutions. Independent R&D teams assembled

spontaneously and competing with each other. 80% of the rewards for innovation came from the tender system of Wondercoating. These rewards contained an initial buy-out, plus share out bonuses. Every R&D team possessed full domination to decide R&D direction while developing the corresponding market. A conservative one demanded 70% monthly salary plus 10% market bonus, while the most ambitious one once demanded 25% salary but 40% share bonus, who later on won the best prize of the company at the end of 2017. Laboratory CEO remained the right of supervising performance bonus with no more than 20% of the total incomes, but the overalls approved the final votes.

Conclusion and Discussion

This study focused on re-understanding of organization design thinking might participate as a critical role in contemporary diversification strategy activities. We introduced the re-understanding through the DIKW Hierarchy to clarify the intention differences of diversification practices. Data and information transmitted for diversification strategy might keep uniformity while knowledge arouses implicit demands and conflicts. The primary reason for this implicitness lies beyond existing experiences, which should tackle through organization design thinking. In cognition of design thinking, the concept of the organization should comprehend as *Knowledge and Learning System*, rather than managerial and administrative structures. Finally, this paper introduced a brief case study of the innovative coating company, to further illustrate how organization design thinking might participate in actual diversification strategy planning and practice.

Implicitnesses of conflicts behind strategy moves are frequently neglected or suppressed in real business. These troubles soon evolve into wicked problems, solving the phenomenon of which would trigger bigger ones subsequently. Knowledge from different experiences and capabilities of discrete individuals project misunderstandings. In this case study, the “self-recovery consummation needs” totally differs between the automobile and digital industries, as user environments, visual tolerances, and propaganda concepts are distinct, though management processes are similar. The human resource system does not possess enough knowledge for estimating future values (Heskett 2017) of

innovation, but its original administrative privilege is excessive. Therefore, in this case, the obsolete human resource regularity became the biggest shackle of the diversification strategy.

This study also has limitations. The new lab in the case study created more innovative management and cultures than those described in this paper, limited due to research levels and word counts. Overall layouts of new lab and existing business, either geologically or strategically, are also a great organization design thinking achievement. However, this paper does not show details about the above views, due to the confidential agreement between the author and the company.

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Design Provocations

Shaping emotions: a study about the feeling of loneliness through the material interaction with surfaces

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Abstract

This contribution aims to investigate how design culture can foster new models of emotional, social and cultural interaction that find in the pleasantness of the surface the creation of valuable experiences for users. In particular, the research examines interaction design from a different point of view, studying the relation of emotions and surfaces in a product-based interaction experience.

Specifically, the contribution presents the results of a workshop called shaping emotions: a formal exercise based on the understanding of how user sensations - without precise references on a particular product - can play a decisive role in defining strategies that embrace the aesthetic and typological sphere of use and meanings. This study has highlighted the transfer of intangible psycho-cognitive aspects into tangible elements whose syntax and semiotics is driven by a phenomenological approach to the formal interpretation of an emotional concept. Emotions that occur from experiential states place the feelings of the human being as a focus of the project; through

the design culture, the study tries to interpret experiences and desires as components of mixed emotions.

Authors keywords

Surfaces; emotions; interaction design; experience.

Introduction

For several years, scholars in the field of design research and experimental psychology have been interested in the study of emotions in relation to the products. Among the most known studies, we can recall those of Pieter Desmet, Donald Norman; in addition to those of Nico Henri Frijda about Emotions. Those studies gave us a solid base in studying emotions related to product design.

Initially emotions were generally considered as a problem, as something to be defeated by the use of rational thought. Only negative emotions triggered the interest of scholars who investigated the manifestation of anger, sadness, frustration, stress or anxiety (Norman, 2002). With modern studies, however, this condition has completely overturned: today science acknowledged that emotions play a fundamental role in guiding human choices and behaviors. Thus, positive and negative emotions are both considered and they represent a significant component in the way products are designed and used. Interaction design studies pay close attention to the role of emotions in the use of products and services. If we consider that the Interaction Design foundation defines interaction design as a discipline that deals with "the design of the interaction between users and products", it is easy to realize that it is not just a matter of studying the interaction with technological products, it is a study on the global relationship with the user.

The aim of this contribution is to focus on the study of the surface as the first step of the interaction between users and product. The surface is intended as the primary vehicle of the relationship- certainly emotional- that occurs. Returning to the technological devices, it is noteworthy to underline that in the age of the Internet of Things (IoT) and smart products, emotions play an even more fundamental role in the interaction with the user. The technological evolution allows us to design interactive products that do not necessarily have screens. Smart products nowadays are able to communicate with each other and, of course, with the user. It is therefore interesting to investigate how the design of the surface assumes even more a central role. The surface is intended as the "skin" of the product, the first factor with which users come into contact, becoming a kind of physical interface.

With the aim of investigating the relationship with the surface, this paper will describe a workshop called Shaping Emotions: a formal exercise based on the understanding of how user sensations - without precise references to a particular product - can play a decisive role in defining strategies that embrace

the aesthetic and typological sphere of use and meanings. The research team chooses to work on solitude, a condition that can be associated with positive or negative emotions depending on how it is perceived and experienced by the user. The condition of solitude has a strong connection with other feelings, it is linked to nostalgia and melancholy, but also to inwardness and creativity: to retreat into oneself to express a new life, a new thought or an evolutionary dimension of the self.

Solitude and mixed emotions

The user experience in relation to a specific product is strongly linked to the emotions that this product evokes. Before emotions aroused by the use of a product there are those provoked by its perception through one or more of the five senses. In this aspect of perception, the surface of the product is the primary actor with which the user comes into contact and, therefore, the first characteristic of the product to arouse an emotion.

To investigate this theme, we organized a weeklong workshop, during which the participants (students of the first cycle of university education in product design) worked on the design of a surface that refers to a specific sensation. The workshop took into consideration that many events that can be found in everyday life are due to unequivocal, but mixed emotions (Fokkinga, Desmet 2012). Participants were asked to give their own formal interpretation to the concept of solitude. The sense of loneliness is not necessarily a consequence of the condition of being socially isolated as "the experience of isolation, the sense/ feeling/awareness to be separated from other people, [...] is not in itself an emotional state: it does not entail any particular desires or evaluations or pleasures or pains" (Koch, 1994), it depends on how people interpret and live with it.

The reason for choosing this sensation lies in the ambivalence of emotions connected to being alone: loneliness is the discrepancy between the social interactions an individual need and the level actually reached. Aloneness can simply refer to a condition of the absence of social interactions without any negative reference. Solitude is basically a subjective experience, on one hand an individual can feel lonely alone, but also in the middle of a crowd; on the other, solitude can have positive effects on individuals.

One study found that, although time spent alone tend to depress a person's mood and increase feelings of loneliness, it also help to improve their cognitive state, such as improving concentration. Furthermore, once the alone time is over, people's moods tend to increase significantly (Larson et al., 1982). Solitude is also associated with other positive growth experiences, like religious or identity building experiences (Suedfeld, 1982).

Although it is difficult to classify emotions, Frijda's work represents a substantial contribution to the arduous attempt to understand human emotions. The author elaborates 12 "laws of emotions", to which this research refers. In particular, it refers to the situational significance of emotions:

According to Frijda emotions are the result of specific situations, two similar situations give life to the same type of emotional response. Moreover, this study refers to the "law" of "Apparent Reality" according to which is the interpretation of reality to give origin to emotions, not the reality in itself (Frijda, 1986, 1988).

The fact is the same: an individual alone, yet this condition can be interpreted in two different ways. The first way links the condition of being alone with the feeling of loneliness, or a state of sadness in being alone. Solitude can also express the pleasure of being alone, to find oneself or enjoy their own interests. Therefore, solitude can arise negative or positive emotions and can arise both, it depends on the situation and on the interpreter.

Shaping Emotions

The experience described in this paper is about young designers dealing with the role of shape as a synaesthetic element, transcending specific product categories and developing concepts of pure content transfer through monomaterial prototypes (designed and subsequently prototypes through 3D printer). Specifically, the contribution presents the results of a workshop called shaping emotions: a formal exercise based on the understanding of how user sensations - without precise references on a particular product - can play a decisive role in defining strategies that embrace the aesthetic and typological sphere of use and meanings. The aim of the workshop was to allow participants to interpret solitude and then, based on their personal interpretation, they proposed a concept of a surface that represented it. As Desmet wrote, "it is difficult to find general relationships between product appearance and emotional responses because emotions are essentially personal" (Desmet, Hekkert, 2002).

Participants were asked to give a personal interpretation to the concept of solitude, then they worked in pairs with the aim of confronting their personal interpretations with the partner and then synthesize in the project of a surface what was the result of a comparison on personal emotion. Participants, therefore, tried to create a synthesis and a relationship between the personal emotion and the appearance of the formal result. Students worked on a dimension of 200x200 mm, like a tile. Reasons lie in the goal to make them focus on designing a surface that led to the emotions connected to the concept of solitude and, of course, in prototyping requirements. Some of the results of the workshop will be described below:

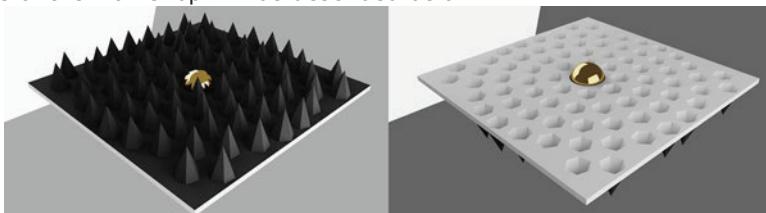


Figure 1. Shape of Solitude expressed by Giulia Piscitelli and Filippo Testi during the workshop Shaping Emotions.

Some participants choose to represent the ambivalence of solitude with their artifact. The example of Figure 1 makes clear the aim of emphasizing the negative (with black color) and the positive aspect (with white color) of solitude. In the first case the concept regards the interpretation of a solitary condition as an “other people” choice and, therefore, suffered by the individual. The individual is represented with a golden half-sphere that in the image on the left is isolated from sharp, hostile pyramids. Solitary, and here we explain the second meaning, are also those who isolate themselves by their choice, so those who take refuge in their own space and dedicate themselves to their own interests, obtaining a sense of absolute pleasure. The latter individuals do not seek any gratification or recognition from the society, but find satisfaction and well-being within themselves. On the other side of the surface, in fact, the pyramids disappear, giving way to the voids from which we can see their inner surface and the golden hemisphere that crosses the surface remaining the same. The first side aims to express the negative sense of Solitary, the other the positive one. The individual is symbolically represented by the sphere, which is distinguished by the surrounding pyramids by form and substance.

A tremendous condemnation or a marvelous conquest? This is the question, the primordial reflection present and underlined also in the second concept (figure 2), in which the participants gave an ambivalent interpretation of the concept of solitude similar to that illustrated in figure 1. In these examples of surface it is possible to observe how the participants have interpreted a mixed emotion derived from the condition of solitude. Other participants, on the other hand, gave an exclusively negative interpretation as can be seen in the example of Figure 3. We can see, in fact, how furrows placed at different levels trace individual paths that sometimes intersect.



Figure 2. Shape of solitude expressed by Linda Baroncini and Samuele Salvadori during the workshop shaping emotions.

These “meetings” between the lines are accidental and episodic and intend to represent a condition of inner solitude together with other individuals. A tangle of connected lines, in which, however, the single line remains visible, which therefore represents being really alone. The concept is further emphasized by the fact that the lines are at different height levels.

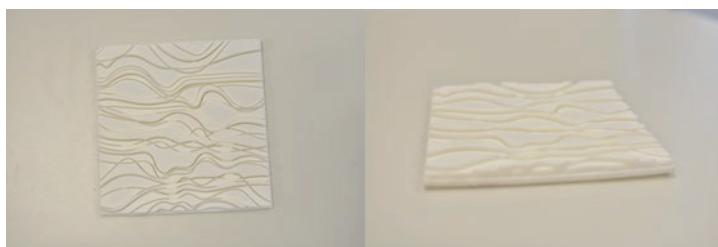


Figure 3. Shape of solitude expressed by Sofia Collacchioni and Chiara Nardone during the workshop *Shaping Emotions*.



Figure 4. Shape of solitude expressed by Carlotta Chiavacci and Elisa Luisi during the workshop *Shaping Emotions*.

Some participants have interpreted solitude as a moment of refuge in themselves, a protection from the outside, a time dedicated to personal growth or of knowledge of the self. This type of interpretation emerges from the examples shown in fig. 4 in which we can notice that solitude becomes a cap, which isolates from the outside world protecting what is inside it.

In particular, while in the image on the left the insulation is rigid and permanent, in the image on the right we can perceive a reference to the symbology of the wave. The wave is nothing but water, like everything that surrounds it but at the same time isolates itself from the rest for a few moments. The wave refers to the fact that there is no separation between an individual and others, nor between people and reality they perceive as external. In this case, therefore, the condition of solitude is seen as a non-permanent protection.

3.1 Mixed emotions and shape definition

Each group of student analyzed their ideas and emotions about solitude. Then, following the models of "Mixed Emotion workshop" elaborated by Desmet, they tried to bring the analysis activity to specific subgroups of mixed emotions (ME):

- ME Group 1. Different stimuli lead to different feelings and different emotional contexts.

E.g. "I'm excited to attend the campus design of UNIFI, because it is clean and well organized but I'm scared of moving in another town".

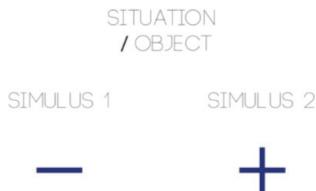


Figure 5. Mixed emotion group 1 diagram.

- ME Group 2. A negative event is set up as a positive event (or vice versa).
E.g. "my friends have decided not to leave for the trip anymore. It will be a good opportunity for me to really know the place and a different culture".

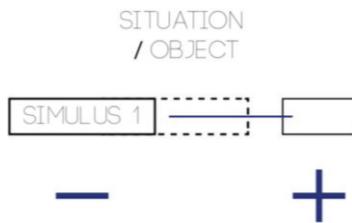


Figure 6. Mixed emotion group 2 diagram.

- Me Group 3. Ambivalent Contrasts, containing two choices for the user and the following two related emotional contexts.

E.g. "I had to study, so I decided not to go to Jenny's party. This allows me to study, but at the same time I feel frustrated for not being with my friends".

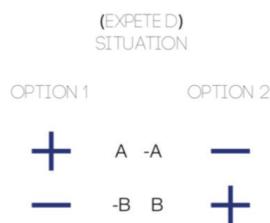


Figure 7. Mixed emotion group 3 diagram.

Discussion

The aim of this research was to experiment a sort of “primordial interaction design” based on the design of a surface as an activity that has the primary objective in finding shapes for emotions.

It is acknowledged that the processes of innovation can be incremental, substantial, radical and driven by meanings (Verganti, 2009, 2017); in this context the research aims to work particularly on the latter. The resulting models represent positive or negative emotions related to the personal perception of solitude. Through the shape the designer approaches or detaches him/herself from the reference archetype by structuring a dialogue between user and product that can develop products able to form these emotional connections with users. We believe that the study of the surfaces rises in importance in the context of Internet of Things, since the interaction with the technological object is not anymore to be intended as an exclusively screen-based action, on the contrary, it should be considered as a product-based environment in which the entire surface of the product is the interface.

Moreover, in the study of morphology, the shape has a crucial role in the age of interaction, performance and technologies incorporated into products: it can bring innovation both in the morphological aspects and in the pure formal and aesthetic aspects of the product.

This study has highlighted the transfer of intangible psycho-cognitive aspects into tangible elements whose syntax and semiotics is driven by a phenomenological approach to the formal interpretation of an emotional concept. Emotions that occur from experiential states place the feelings of the human being as a focus of the project; through the design culture, the study tries to interpret experiences and desires as components of mixed emotions.

The shape of a product has always represented an element of differentiation on the market; the shape structures a dialectic between user and product through the morphological aspects.

Through the form it is also possible to create new ways of using the product, leading the user to specific reference scenarios. But surely the element in which the shape plays a crucial role is the innovation of meaning (Verganti, 2009) or in the emotional design (Norman, 2002) that is the meaning that the product assumes in the habits and in the scenario of daily use.

The form is therefore intended as a driver of innovation processes in the contemporary interaction systems, amplifying and interpreting the functional values of the new technologies incorporated into the product of which it becomes a vehicle.

We therefore argue that the relationship between mixed emotions and design arises as a delicate terrain in which it can occur (Desmet 2012):

- an "enrichment" of a user experience;

- a lack of effect in the user experience;
- an impoverishment and worsening of the user experience.

First of all, the stimuli that determine the emotions were identified. In the case of a product, it is never a matter of the whole object to generate a certain state of mind, but an aspect or a part of it (Desmet, 2012). In particular, we can recall two types of emotions: a first "experiential" type that is developed in a direct interaction with the product or the product system; a second that is "behavioral" in which we can find a tendency to do or perform something, "good" in a definite way relative to usability.

Design should deal with the subjectivity of individuals' experience as along with the progress of science and technology information and the development of social economy, the human has entered into the experience economy era. To adapt to the requirements of the new age products, design emphasizes on interaction and blending more and more, the user experience (Junhong Hu; Xiaoshan Huang 2012)

Once researchers begin talking to individuals, however, they quickly learn that "alone" is an objective term-indicating whether a person lives with someone else, how many friends he or she has, and so on; but that "lonely" is subjective, a matter of what goes on in a person's head.

Conclusion

In the study of a product system, the form/function ratio becomes form/performance. In the form/performance relationship, dialogue takes place between formal and functional values (as tangible values) and between sensory and emotional values (as intangible values). Treating the complexity of solitude, in a qualitative and quantitative sense, means giving shape to the sensations in their multiple variations and the complexity of synthesizing them in a shape or a treatment of a surface, this was the focus of this research.

The research thus highlighted the transfer of intangible psycho-cognitive aspects into tangible elements, with their syntax and semiotics. In fact, the emotions that occur from experiential states, analyzed in this research, put human beings at the center of the design process. The research aimed at shaping experiences and desires as components of emotions through the design first, and consequently the realization of emotional models. We intended shape as an expression of the synthesis of feelings and experiences, which correspond to the perception of a physical or psychological condition.

The analysis of emotional models in which the designer wants to give shape to the ways of emotions bring with them fluidity and rigidity, intensity, roughness, density, discontinuity, fullness and emptiness that represent lifestyles. The emotional models we discussed in this paper tend to define sensations in shapes, textures and finishes.

We have created structures that are often complex in form, sometimes composed by layers with the intention of defining the emotional sphere in its qualitative and quantitative aspects and therefore representing the behavioral aspects of the user.

The various forms of solitude synthesized in material models the relationship between visceral emotions and reason. In these models the presence of human being becomes a permanence in which the curves, the rectified curves and the few lines represent the multiple expressions of the feeling of solitude.

Acknowledge

The works presented in this contribution have been carried out by the students of the first cycle of university education in product design. As was also mentioned during the paper the prototypes are the result of their personal interpretation of the given brief. We therefore thank the participants of the 2018 Product Design course, Design Campus-University of Florence.

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Transactional Urbanism – Resilience in the epoch of collaborative consumption

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Abstract

The city once understood as homogenous and static is at the centre of a rapid metamorphosis driven by the nexus of socio-economic, political and technological change. The shift into intangible domains was prophesied in Jean Gottmann's *'The Coming of the Transactional City'* (1983). Gottmann posits cities as hosting environments for transactional activities, an early observation of ubiquitous information services. The global financial crisis of 2008, and ensuing economic and political uncertainty, further catalysed a series of opportunistic economies of collaborative consumption that have commodified and intensified the city and its architecture. These platforms are vital intermediaries and augmented interfaces between 'users' and urban environments - how contemporary cities and architecture are experienced and infrastructures valued. *How might design through information flows catalyse more resilient and robust urban form? What is urban resilience within the milieu of the 'gig' economy?* The paper will present paradigms for the impact and transformation of new economies on the fabric of the city, focusing on how the shift from 'ownership' to 'access' has fundamentally co-opted the built environment through architectural and urban interventions. It will be illustrated through various lenses - living, working, mobility and in-between. These peer-to-peer platforms present an accelerated version of existing distribution systems

of city. The proffer an opportunity to leverage, reassess, and speculate about the future of the city. The research draws from both precedent and design provocation to assess how architecture and urban design is valued in the post-urban, post-critical era.

Author keywords

Transactional; Urbanism; Sharing-economy; Collaborative-consumption; Architecture; City; Gig-economy; Future-city

Introduction

'The future is already here—it's just not evenly distributed'_ William Gibson

Cities are in a constant state of flux. These anomalous characteristics and behaviours are a product of its interaction with local governmental policies, market forces, social and economic practices, as well as fluctuations on the global dais. These uncertainties, make any attempt to distinguish or intervene within their complex organisation, precarious. Unsuccessful or flailing modernist enterprise, the rise of nation states and unbound exuberance of the free market economy, has coincided with the retreat of creative disciplines from the civic realm and public imagination. Collectively, the models and tools of engagement of architects, urban designers and planners with the city remain didactic and hierarchical, and arguably have not adapted to the plurality of the urban environment, its variables, and utter hybridity.

The increasing decentralised forces – from transformation of workforces amid post-industrial paradigms, ecological and environmental change and migration, that have reshaped contemporary metropolitan regions, compel a new manner of engagement. The urban debate centres around regulating population growth and consequently ways of moving people and goods over increasing distances. While crucial and generic concerns, cities continue to operate within contested spaces, disputed forms of urban renewal and antiquated models of real estate speculation. These cannot be addressed as static, parochial identities, and call for acute, nimble tactile responses with overarching strategic foresight.

Overall, productivity of infrastructure has declined (Rifkin, 2017) and the relative pace of transformation of the 'soft infrastructures' of the city has created a schism, prompting an evaluation of design and the agency of creative disciplines in the city.

Methodology

The research operates in the domain of design as a medium for conducting research – analysing, mapping and reflecting on architectural and urban projects and ideas, in conjunction with socio-cultural dynamics. It recognises design speculation and modelling as potent tools to reveal and amplify critical observations and engage in procedural experimentation in the medium of architecture and urban design. While its discourse is global, the paper dials into Melbourne, Australia, leveraging the issues and potentials of the current city, and its future - where the medium and high-density developments proffer unique opportunities within specificities of its urban transformation for new typologies, intensities and densities to be deployed. The paper, examines the role of precedent, data and emulation informing the city while constructing a potential design briefing document. Precedent and best practice are determined to establish a narrative and conceptual focus for potential transformation of the fabric of the city.

Transactional Urbanism

In *Megalopolis* (1961), Jean Gottmann began to describe transactional forces that stemmed from a labour pool once engaged primarily in the production of goods and tangible products, that were rapidly moving to a model of processing and managing intangibles like information and knowledge. (Corey, Gottmann, 1983, p. xi) In assessing the role of cities, it became apparent that cities were still the 'principal loci' (Corey, Gottmann, 1983, p. xi) for activities that were now akin to transactions. The shift into intangible domains was elaborated through *The Coming of the Transactional City* (1983). While the paradigm was rather nascent, Gottmann posits cities as hosting environments for transactional activities.

Access (in a broader sense) to nodes of hyper-connectivity are a vital force in globalisation. As a counterpoint to Thomas Friedman's 'flat world' dictum, which describes the levelling effects of technology on a global scale, urban theorist Richard Florida observed that from an economic, consumption and innovation standpoint the world is 'spiky' (Florida, 2005) – a view that is ratified by the explosive growth of cities, manufacturing hubs and nodes of service activities.

In the intervening decades, digital transformation has continued to be an imperious force driving the metamorphosis of cities and regions, where de-spatialised dynamics and variables increasingly effect how cities are described, understood and valued, fundamentally increasing pressure for deeper societal change.

'*Transactional Urbanism*' is a protraction of the flat, spiky, decentralised city, expressing the significance and influence of ubiquitous transactional exchanges on the form of the city. It presents the techno-social spatial domains that engender the city – an urban realm that is remote, dispersed yet kinetic and all-pervading and responds to a subtle relative pace of change. The transformational shifts are simultaneously incremental and rapid, and adjust, occupy and insert themselves within the fabric of the city. The 'sharing' or 'peer-

to-peer' economy has accelerated the distribution and division of individual transactions, altering the form and order of the city.

Disruptive Sharing

The now ubiquitous term 'sharing economy', also described as 'collaborative consumption' and the 'gig economy', is a decentralised platform for commerce and transactions, that operates from peer-to-peer (P2P).

While, the sharing economy is a product of capitalism, it signifies a new, possibly novel economic system, and the first since capitalism and socialism. (Rifkin, 2017) Economist Jeremy Rifkin places the sharing economy at the centre of the current epoch he refers to as 'The Third Industrial Revolution'. The 'cloud' (cloud computing), big data and an Internet of Things (IoT) have fueled a 'planetary digital interconnected platform'. (Rifkin, 2017) The convergence of new communication technologies, energy regimes, renewables and mobility – i.e. an unfolding of a matrix of co-dependent 'internets' has collectively energised fundamental economic change.

The sharing economy is still a rather ambiguous term, as it is not explicitly sharing in an altruistic or charitable sense but is focused on monetisation. It enables the commodification of personal assets – this could be a villa, an apartment, a spare bedroom, the rear seat of a car or one's indefinite time. People have had not dissimilar interactions prior to the pervasive IoT. The P2P economy is perhaps unique, insofar that it has numerous centralities and terminals of exchanges within a decentralised landscape.

On one hand it's plausible that this economy is catalysed by the technological backbone, but simultaneously no coincidence that its genesis coincides with financial crisis of 2008, the economic and political uncertainty and austerity, that further catalysed a series of opportunistic economies.

The P2P economy exposes areas of impunity within the urban system - critical triggers that precipitate in tectonic shifts in cities -

- The generational swing of renting (leasing and borrowing) rather than possession, prioritises 'access' as opposed to 'ownership'. For the city and its architecture, this compels a rethinking of new centralities and transit nodes. *Other industries and technology services are transitioning from one-time purchase to long-term subscription models.*
- The focus on under-utilised assets suggests the potential for a more efficient pattern of usage and occupation of objects, spaces and cities.
- The P2P economy has usurped systems for valuation (and value) and how value is described and measured. Functions of 'proximity', 'likes' etc. now determine value.

These economies have prompted inventive if not radical application of logistical, commercial, spatial and legal frameworks. Their expeditious uptake has also raised serious regulatory concerns – from confrontations with labour unions, monitoring minimum wage to safeguarding users and contractors. From artless ‘star-rating’ of services to China’s proposed *Orwellian ‘Social Credit System’* - that standardises social reputation through a credit system from integrating data from various regulatory bodies, social media, invasive surveillance and other platforms to ‘score’ individuals – we have barely begun to understand the sharing economy and collaborative consumption.

Smart vs Collaborative

It is vital to locate the sharing economy adjacent to the concept of ‘Smart Cities’ which will also be a protagonist in the future city but rooted in a different set of assumptions and aspirations.

The ‘Smart City’ has become symbol and symptom of political change, of aspirational governance shifting one’s gaze from space to data, and from civic to corporatisation. Arguments against the smart city cite the following: that it is incompatible with an informal character of the city, that it subjects the city to corporate power and that it reproduces social and urban inequalities. (Krivý, 2018)

The smart city as a proposition has become a hegemonic notion of urban governance, transforming and supplanting planning, (Krivý, 2018) where the prevailing focus is infrastructure and not architecture or urban planning. (Mehrotra, 2015) It is more than the movement of data. It is the exchange of capital.

Collaborative consumption is one attribute of the sharing economy, referring to events in which one or more persons consume economic goods or services in the process of engaging in joint activities with one or more others. (Felson, Spaeth, 1978) It involves not mere “consumers” but “obtainers” who may also be “providers”, (Ertz, Durif, & Arcand, 2016) and stakeholders sharing resources.

Opportunism and desperation are perhaps two sides of the same coin. Surge pricing is feature associated with *Uber* and other ride-sharing services. In essence it’s a supply-demand multiplier, that exponentially increases the rate at moments of bad weather, rush hour, and special events, for instance, may cause unusually large numbers of people to want to ride, all at the same time. (*Uber*, 2019) This also encourages more services on the road. There are, off course, legitimate concerns around mobility services that adopt a model that exploits adverse circumstances. (Pyrtz, 2018)

If we look past profiteering, this demonstrates an almost sentient connection with the city. It senses the city and can actively respond to it. Whether a sporting event or the disruptions to the city’s public transport infrastructure, a user-generated data set mobilises a heightened response.

The speed at which such information can form feedback loops is remarkable. The contention here is that this order of computing that can correlate and perhaps even anticipate is underestimated. The sharing economy has inadvertently stumbled on a smart city, one not created by governments or political interests, but by users, subscribers and citizens. *Can this be harnessed for social benefit?*

Resilience

Resilience and more explicitly 'urban resilience', does not conform to a precise definition or criteria, but rather an overarching outlook. The ambitions '100 Resilient Cities', portal pioneered by the *Rockefeller Foundation* places resilience as the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

The P2P economy is arguably the most pro-active contributor and beneficiary of understanding and leveraging the systems that constitute the city. Their contribution when approached in parallel with the interdependencies in urban environments and risks, suggest that they are already being harnessed to adapt and grow. While the first wave of application has been propelled by convenience and access, there are emerging scenarios (as pointed to later), where P2P models cohabit and augment a city's cause towards more resilient future.

The key strains of governance will by nature be urban issues - slow growth, declining productivity, unemployment, increased consumption, ecologies, and so on. Current practices alone will not offer robust solutions and there appears to be a fissure between the ideal to which cities aspire and the predetermination to act, despite the availability of means. This is undoubtedly a domain design and creative place can inhabit and thrive in.

Extended realities

Historically, cities have been challenged by other such disruptions - industrialisation, health and sanitation, the automobile, post-industrialisation etc. These peer-to-peer platforms present an accelerated version of existing infrastructure systems of city. Once again this is an opportunity to reassess and speculate about the future of the city.

The shift from a topology of physical infrastructures to geography of services presents a unique opportunity to re-order values, reconcile and reconsider design processes and procedures of engagement at an anatomical and morphological level.

Subsequent sections outline a series of projects, precedents and case-studies that share this agenda.

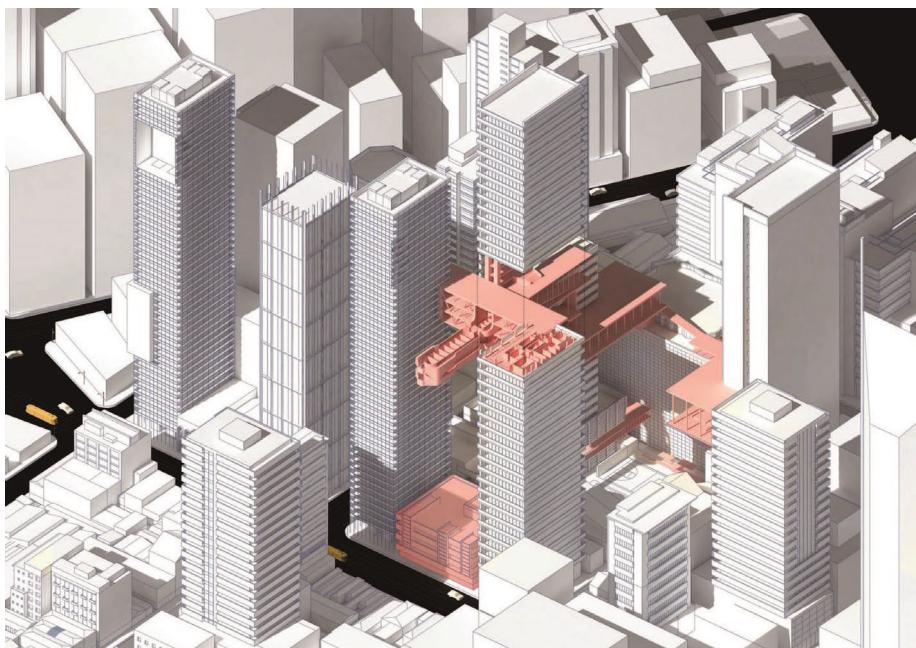


Figure 1. Relational Infrastructures - Augmentation of City Blocks © Ian Nazareth, 2018

Relational Infrastructures:

Relational Infrastructures (Nazareth, 2018) considers the impact of new economies on the fabric of the city, focusing on how the shift from 'ownership' to 'access' introduced by peer-to-peer (P2P) models and the 'sharing economy' fundamentally transform the built environment through architectural and urban intervention.

The project homes in on the possibility to address ageing and designing for demographic transition alongside the intensification of the city. A significant part of this scenario was the proposal of models and typologies for multigenerational homes and ageing in place which could be introduced through intervening within the high-rise tower. The integration was explored at the scale of the building and catalysed at the level of the precinct. Virtual platforms like *AirBnB*, *Stayz* etc, also legitimise an economic framework for the elderly to lease and rent their property and sidestep the financial stress of retirement homes. There is also a benefit to proximity to services, amenity and transport, further reducing dependency. The overall transformation of the block, and reduction in private car usage – only one in every nine remain – presumed by the mobility P2P platforms like *Uber*, *Lyft*, and other ride-sharing and car sharing offerings, release vast area proportions of floor plates within the four blocks. These are now available to host a constellation of activities, facilities and landscapes.

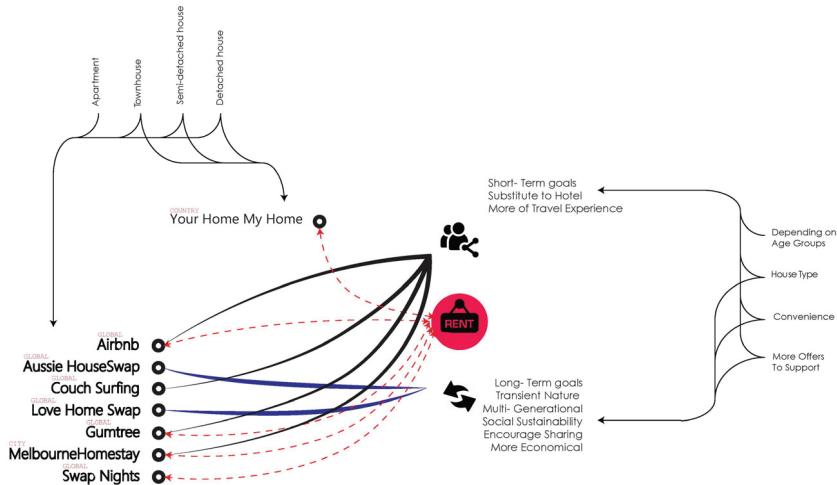


Figure 2. P2P Platforms and Models of Living © RMIT University, 2018

Relational Infrastructures is a speculation and early experiment in creating linkages and infrastructures across the block, connecting projects. The city block itself becomes a hyper-infrastructure system unfolding from its built fabric. These areas become nodes and multi-program platforms, and reconsider what a discrete tower might be.

Here, the project acknowledges the new zeitgeist, and the mechanism through which P2P economy has mobilised the soft infrastructure of the city, reinforcing the city as a hosting environment and armature for possibility. This analysis, prompts a revisiting of the perceived efficiencies and patterns of occupation.

FutureWork

Technological and social forces are transforming how and where work gets done, who does it, and even what work looks like. (Stockton, Filipova & Monahan, 2018) Future trajectories of the workplace are driven by flexibility, technology and wellbeing. The established spatial and organisational hierarchies are redundant, where remote work, co-location, collaboration and access to infrastructure and services take precedence.

The workforce is transitioning both in format and location of organisation as well as generationally. Office space is typically the second-biggest cost for organisations and research suggests that up to 40% of office space is vacant at any one time. (Sander, 2017) Moving forward, there must be a strong argument for clients, employees etc. to converge in a workplace or physical environment. Organisations and professionals will critically assess the possibility of shared workspaces, activity-based work, hotdesking in lieu of long-term leases, alongside a deep consideration for the locations at which they make these

available. What typologies of productive environments does uncertainty stimulate?

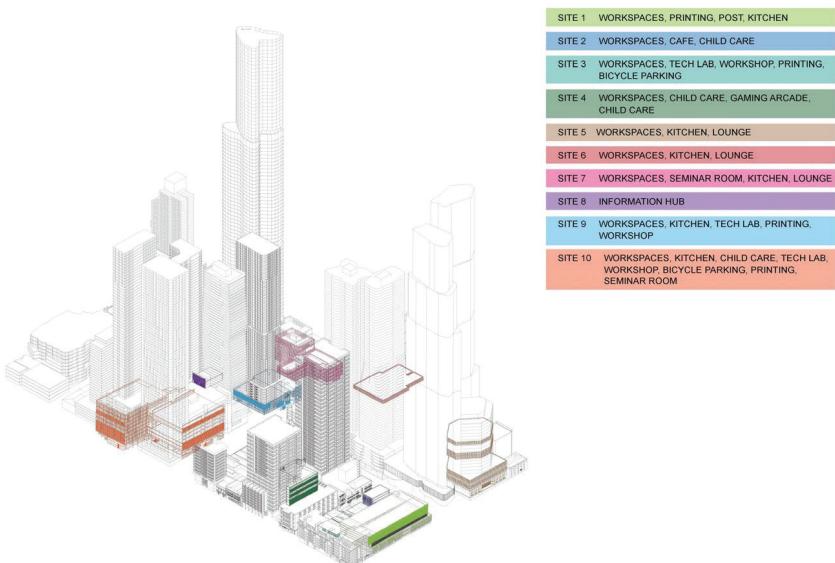


Figure 3. Work Melbourne - Amenities © RMIT University, 2018

Work Melbourne (Nazareth, 2018) speculatively accelerates this paradigm, suggesting that the future requirement for office space will be transitory, specialised and itemised, with a focus on access to amenities. Public libraries are often utilised as makeshift workspaces and universities view their campuses as directory of rooms and facilities, that can be programmed.

Four city blocks in Melbourne's CBD that consist of a high proportion of residential towers, mixed use development, and a university campus are remapped and catalogued. Following the spatial audit, a range of typologies are included, also accounting for vacancies and potential expansion into underutilised car parks (made redundant by ridesharing) and creating physical linkages between office spaces across the block.

A constellation of shared infrastructures – from printing terminals, cafes, pantries, 3-D printing, robotic and advanced manufacturing workshops, conference and media labs to childcare / day-care services are distributed across the four city blocks.

Work Melbourne collects this information and grand schedules into a web and mobile platform, also integrating various existing shared workplace providers like WeWork, Hub Australia, CreativeCubes Co, etc. Subscribers review the

offerings, and select appropriate spaces, specifying their requirement for facilities, childcare and so on.



Figure 4. Work Melbourne - Interface © RMIT University, 2018

Work Melbourne reads and interprets the urban environment as a matrix of assets that are spatial and indexical. It offers unique insight into the built environment and presents an urban identity for workspaces within the precinct. It also serves as physical and virtual portal, consolidating diverse services, potentially intensifying their operation and amplifying efficiency.

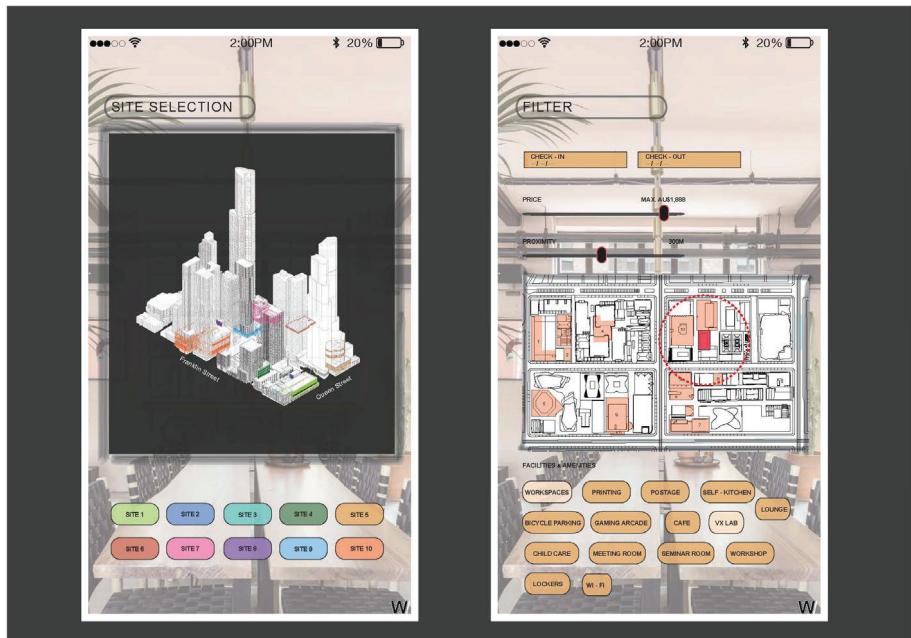


Figure 5. Work Melbourne - Assets © RMIT University, 2018

Blockchain Urbanism

As a generalised description, *Blockchain* is a digital ledger of transactions that can be programmed to record numerous forms of transactions that includes anything of value. A point of difference with preceding platforms, is its digital information is incorruptible and can be distributed but not copied. (Blockgeeks, 2016) Blockchain technology is the root of *Bitcoin* and other cryptocurrencies but has the potential to create the backbone of a new type of internet. (Blockgeeks, 2016) It has implications far beyond cryptocurrency and could redefine fundamental structures in our economic, legal, and political systems.

Extending the principles of collective housing and the community as a surrogate developer, Doma and Eutropian proposed the Andel 2.0 model. Doma positions itself as an alternative to the binary of either renting or buying a home, without relying on banks and mortgages, but on a network of people and places. (Doma, 2019) Andel 2.0 is a reaction to the observation that while there are many building designs for collective housing that can be drawn on as a resource, the number of economic models to realise these are scarce. (Imagine, 2019, p. 100)

The project utilises open-source housing design together with smart insurance and maintenance models, to provide a framework for civic participation in housing design, construction and management, and ultimately catalysing a new movement for city-making. (Imagine, 2019, p. 104) Andel 2.0 uses open neighbourhood data and open city information modelling (BIM) to create a new, digitally verified land market that give permission for new types of civic

financing, planning rights and legal status for civic groups to design and build. (Imagine, 2019, p. 101) Here the existing state infrastructure model is augmented into a joint civic 'platform' for providing cooperative housing and neighbourhoods. Andel 2.0 acts as a type of city wide collective 'landlord' allowing people to use their monthly rent payments to build up equity within a city-wide system, via state-backed blockchain tokens. (Imagine, 2019, p.102)

These propositions are untested and its risk yet unknown, but its value proposition is clear. Through decentralisation, blockchain technology can open access to ownership, and at an elemental state, redefining our perception of the built environment and its architecture as not merely floors and walls, but as 'shares' in a company or building.

There are plans to transform a 67,000-acre (27,113-hectare) plot in the Nevada desert into a smart-city powered by blockchain technology. With neighbouring hubs of major tech giants including Google, Apple, Switch and Tesla, the project envisages a new kind of business and residential community. (Gibson, 2018)

Homelands

Collaborative consumption is a rhetoric that calls for a conclusive understanding of how the built urban fabric and infrastructures are utilised. This can be mined as a commercial entity as demonstrated by numerous multi-national corporations that offer services for profit as well as to address deeper, systemic social concerns.

Homelessness is another severe urban challenge for cities. An address is no longer just a location - it's now a de facto means of identification. This means that if a person becomes homeless they are immediately cut off from the basic services they need to recover. (ProxyAddress, 2018)

UK based advocacy group *ProxyAddress* proposes a way to provide those faced with homelessness with a consistent address by using a database of empty properties. There are approximately 30 million addresses currently within the UK, over 95% of which are residential. (Postcode Address File, 2017) Over 500,000 of these are empty in England alone. Of these, over 200,000 have been empty for more than six months, while over 11,000 have been empty for more than ten years. (MHCLG, 2016)

ProxyAddress provides stable addresses throughout this period of instability. It uses existing records of empty properties to create a 'proxy' address - one which can be used to access services and provide identification regardless of location. (ProxyAddress, 2018) *ProxyAddress'* Chris Hildrey notes 'the question was how to use our sense of the built environment in such a way as to effect change.' (Hildrey, 2018)

Pattern Recognition

The city encounters uncertainty and volatility that is, today, fast-tracked across all its operations. The abrupt shifts are often profound, where vast bureaucratic and political structures aren't agile to respond to the fleeting, potentially violent momentary lapses that the contemporary city propels. Most actions involve immediate intervention, response and even risk management, and lengthy policy processes can be ineffectual in such matters.

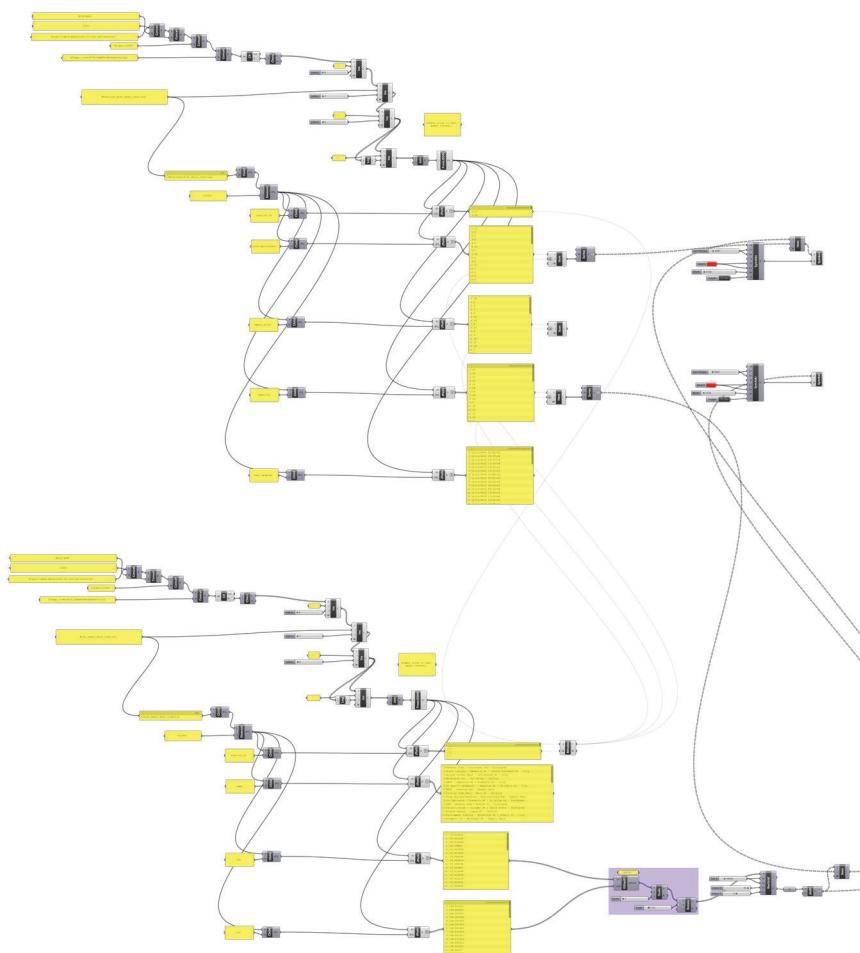


Figure 6. Firmware – Section of the Grasshopper Canvas © Ian Nazareth, David Schwarzman, 2019

Firmware (Nazareth, Schwarzman, 2019) is a design- research excursion on the city, approaching digital interfaces as physical environments. *Firmware*, draws reference to a particular class of computer software that provides a standardized operating environment for the device's more complex operations. Without firmware, a hardware device would be non-functional.

This analogy is deployed to focus on the relationship between virtual applications, digital realms and physical spaces in the city, as well as the implications they have on the temporal and permanent patterns of occupation, spaces, typologies etc. It seeks to establish a platform through which virtual (and even real-time) data can be juxtaposed from multiple sources and spatialised.

This project is empowered by a process of data scrapping – whereby geo-referenced information and data from web-based *Application Programming Interfaces* (APIs) can be extracted into design environments. Here raw information is co-referenced. The platform is thus a conduit between APIs and computer aided design application (*Rhinoceros 3D*) through an algorithmic visual programming language. (like *Grasshopper*).

The focus is to hybridise disparate datasets from public services and private entities who have a vested interest in the city. This convergence offers architects, planners and other disciplines an insight into behaviours of cities and networks, all captured through decentralised systems. These can record and reveal patterns and offer new ways of engaging with the city.

Using metropolitan Melbourne as a prototype, it can connect open-source city data, city-council specific information, public transport, carpark availability, alongside *AirBnB* listings, *Uber* movement etc. Drawing from multiple insular datasets simultaneously, it offers a collective assessment of collaborative consumption.

At present these are analytical devices that reveal subliminal infrastructures of the city that could be pivotal to the future of the city. In the early phase of analysis, the project has demonstrated a range of new centralities that emerge, that are ironically a product of the decentralised economy. This has enabled a finer grain focus on such areas, that can be activated in future development, statutory planning, mobility strategies for cities and so on. It also indicates the potential to identify stakeholders and commence engagement at an early phase of long-term strategic urban projects.

How could emergency services improve response times and effectiveness? Could public transport and ride-sharing networks create more efficient and sustainable mobility networks? How might citizens and designers, collude with a centrality of information to understand the city as a live organism?

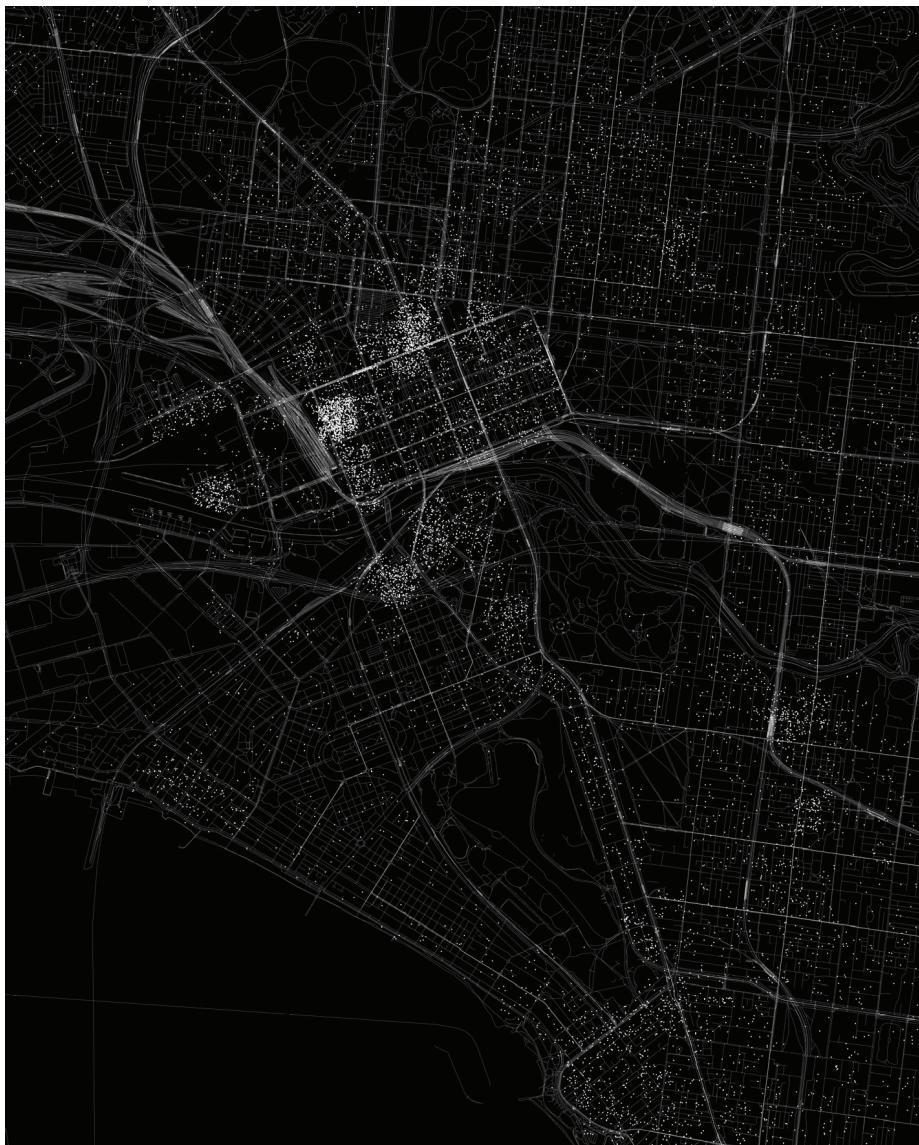


Figure 7. Spatially referenced AirBnB listings from inner-city Melbourne with transit corridors mapped through the plugin © Ian Nazareth, David Schwarzman, 2019

Conclusion

Through experiences and devices, we absorb space, data and information in vast proportions. While many experiences are vicariously wrought through encoded and restrictive interfaces, they temper and influence our perception of reality and space. We are also active, sometimes reluctant contributors, patrons

feeding the limitless system, fodder from advanced artificial intelligences to process, reconcile and make intelligible. We know physical from digital, from leisure, near from remote, city from wilderness but it could all well be the same; collapsed into a seamless superstructure. The rational morphology of the city is superseded by an arbitrary logic of the temperamental, the real-time, the trending and yet an exaggerated blur. We are in control, or so it seems. The awareness of our existence is augmented. We have approached the 'hyper' urban.

British architectural critic Cedric Price, who sought to rethink architecture's relationship with society queried 'Technology is the answer, but what was the question?' as the title of his 1979 lecture, (Price, 1979) a relevant if not more acute in the post-critical era.

The rapid rise of the peer-to-peer economy has already hinted at how technologies that bypass orthodoxies, might be embedded within the cognition of the city, and in equal measure their capacity for disruption. The infrastructures that enable P2P and collaborative consumption could be the pivot for resilience in future urban and architectural form. The future city needs to be adaptable and inclusive. The variants and typologies exist and the new economic possibilities present a compelling armature. It's a question of capacity and redistribution. Millennials are already entrenched in a hybrid economic system each day. (Rifkin, 2017) The sharing economy is a prime variable, and these are futures for local deliver social, economic and ecological resilience in cities.

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The emotions that emerge in the collective creation in a marginal context: Experience in a Chilean Prison.

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Abstract

Society and prison are worlds divided by much more than a wall. Judgments and the absence of love are abysses that separate humanity. Collective creation is a fertile atmosphere for trust and respect to emerging. The design constitutes a vital medium to contribute to the approach of worlds and the generation of emotions that help to this encounter.

The design is a fertile environment because it integrates and stimulates creativity and allows collective creation. A five-year project put together design students and prisoners to work collaboratively to add new knowledge in sustainability and a more in-depth understanding of society. This experience is central to observe the flow of emotions, the contribution of collective creation and the integration of design in complex social areas.

Therefore, this paper was built from a linking project between design students and prisoners. Its structure reflects the observation, the reading of testimonies and the sensitivity analysis of the results. The content is mainly composed of the experience of those who participated.

This article invites to reflect on the role of design as a driver of social integration and collective creation as active participation in the construction of a cultural perspective focused on the well-being of all people.

Author keywords

Emotions; Collaborative Creation; Experience; Cultural perspective; Social Integration

Introduction

Designers can contribute to society through the development and results of their projects; also non-designers can support through their participation in design processes. According to Miettinen S. (2013) "User participation can change society, and service design can contribute with this change". Therefore design -in all its forms- could be an excellent way to be an active agent to improve and collaborate to society.

In the professional formation, it is possible to instigate an attitude and commitment with their surroundings focusing their practice in an awareness of the diverse realities existing in their country and how from their work they can contribute to diminishing the gaps to increase the well-being.

This article exposes the emotions that flowed and influenced a process of collective creation which, in addition to obtaining specific results for the Prison, also meant a transformation process for all those who participated. The Prison is a place with a critical emotional burden, both for those who inhabit it and for those who visit it.

Through the reflection of this project and with an analysis of the situations, testimonies and results invite to reflect on the role of design as a driver of social integration. Also, collective creation could be a way to participate in the construction of a cultural perspective focused on the welfare of visible and invisible citizens.

Framework

Emotions are a subject widely researched from different perspectives. Psychology, anthropology and biology with the areas of knowledge that have worked defining them according to their research. As stated by Bloch S. (2009), there are six basic emotions: Anger, Love, Sadness, Happiness, Eroticism and Fear. These six emotions are the base of other emotions, so if you combine two, three or more of those you can get new complementary emotions like enthusiasm, empathy, inspire, etc

The design has also contributed to the conceptual deepening of the emotions within the areas that concern him. Emotions can be stimulated an internal and external scope; the first is related to internal representations, feelings and memories; the second includes people, objects and experiences. (Van Gorp and Adams, 2012). Therefore, the emotions are fed by the experiences of the present which can modify or confirm the previous representations.

The encounter of such different realities could make possible emotions' transformation driven by the design process. What are emotional experiences? How are feelings related to the body? And How do emotions impact on the interactions between people? These are some of the questions that contribute to understanding the relationship between emotion and experience, generating a base of understanding of what happens in collective creation.

The consciousness of emotional experiences

The biological component of emotional experiences is on the one hand natural responses according to the functioning of the human body emitted from the brain. On the other hand, complementary responses are perceived as sensations bodily and behavioural reactions. Also, for example, through language is possible to express the awareness of what is being experienced, what it consists of and what are the emotions that are unleashed in a specific situation manifested. (Frijda, 1986)

The human being in their life experiences a varied diversity of multifactorial situations. The relationship between experience and feelings can be found in the natural flow of life in which a back-up of experiences is created; that provokes feelings spontaneously produced by states, motivations or emotions activated by specific situations (Damasio, 2018).

Becoming aware of emotions requires a process of distinguishing about what is being experienced. The method of identifying allows us to expand the knowledge of oneself and of everything that surrounds the human being; this process gives us tools to appreciate the subtle and concrete (Tolosa, 2008). Several variables influence the appreciation of emotional experience and different perspectives. Therefore be aware of what is being experienced has conscious and unconscious components, some as automatic reactions and others more like a decision, however, to appreciate them it is necessary to distinguish them and make aware at least part of the process.

Body consciousness

During the development of experience, people can perceive their environment through the body. However, emotions are both personal so can be felt by those who are experiencing it; and public because a person's emotion can be visible to other (Weerdesteijn, Desmet & Gielen, 2005) and can influence interactions with other people. The body perceives and receives the various stimuli, not only allows movement; for instance, Biodanza created by Rolando Toro puts particular emphasis on experiencing through the body led by music.

The importance of the body also lies in what it communicates. Emotions, habits and experiences leave visible marks on the body affecting postures and gestures (Tolosa, 2013). Interactions with other people, the culture, social interactions, food and even the climate, leave traces in people, each one can determine how people will create new relationships and face new scenarios.

Interactions consciousness

Previous experiences influence the present, the interactions and the way to face them. The experience arises in the exchange between people and their environment because it is an essential and fundamental part of the way of life (Dewey, 1934). Therefore each situation and even the natural flow of life generates a personal experience and a unique perception of the interaction with the environment.

The emotions that emerge inside of a community shape the interactions and trigger the personal memory activation defining the behaviour and actions of people (Tolosa, 2013). Thus, the interactions are responses to previous experiences, individual and collective, that determine the scope in which the exchange between people and between people and their environment arises.

The awareness of emotional experiences, body and interactions is a way to increase knowledge about the responses of the human being to a particular stimulus, situation or feeling. Therefore, these responses are the result of the constructed mental model, which is shaped and modified by previous and present experiences that are nourished thanks to the perception of the senses and the emotions experienced (Van Gorp & Adams, 2012). The mental model is flexible and adapts continuously.

The project

The project was a collaboration between the School of Design of the Pontificia Universidad Católica de Chile and Colina II Prison (Image 1) under the Ministry of Justice and Human Rights of Chile. The project's purpose was to provide knowledge on the sustainability and reuse of materials available within the campus. According to Kaplún & Soto (2018), the focus of the project was to deliver specific knowledge on sustainability and design in a collaborative space to guide the transformation towards an understanding of the different possible realities. Gratitude arises as the fundamental axis in the collaborative creation process where the prisoners are considered as equals by the students in the entire design process. In this way the concept of "I Can" becomes ingrained in the prisoners as an experience of success and achievement which opens up a possibility of change, leading to their social rehabilitation.

The project began in the year 2012 with a group of 60 students and each semester new students participated in the program. During the five years of the project, a total of 300 students participated. The first two years the main focus was teaching to prisoners the basic concepts of sustainability to develop with them and students several projects. The following three years, the prisoners teaming up with the students; every group were able to accomplish much more complex design projects.

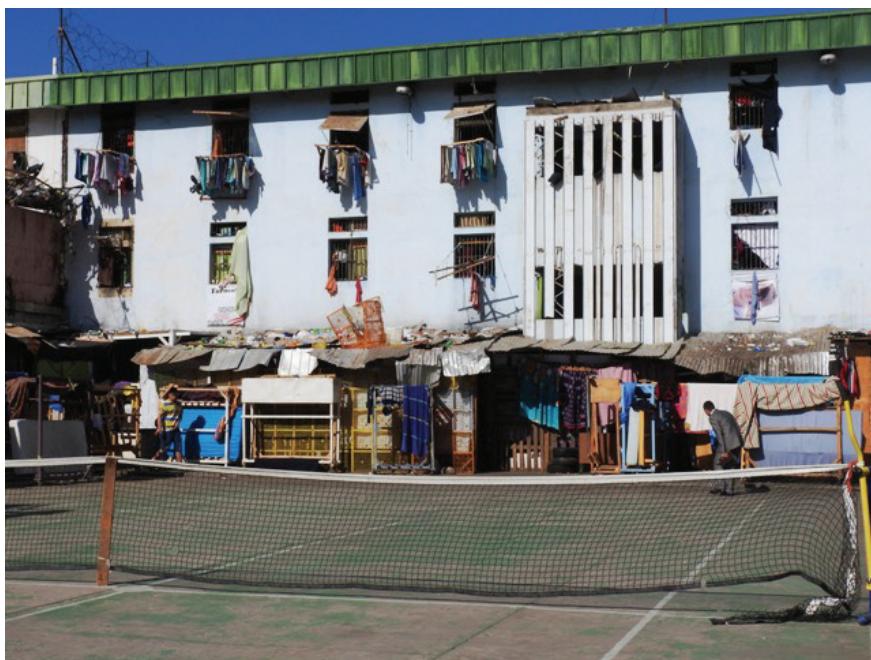


Figure 1: Interior courtyard of Colina II Prison

This project is a way to create awareness in the design students about marginal and vulnerable realities where it is necessary to design with the existing limitations. Developing and fostering a compassionate moral responsibility, as defined by Dalai Lama, to be able to focus actions for the benefit of others over the only personal interest, (Goleman, 2015), is also part of training citizens aware of situations country level and the contributions that as future designers can deliver to the construction of a friendlier society.

The project was organised in work sessions between students and prisoners, provoking a process of subtle and profound transformation. Everyone started the process with apprehensions, the students with the fear of facing one of the unknown sectors and socially denominated as dangerous, and the prisoners with the distance of facing a reality of privileges and abundance. During and at the end of each creative cycle everyone had changed their perception: students and prisoners knocked down their prejudices.

Each one of these spaces of work, meeting and creation was constituted as a creative community where all contributed with ideas and reflections to create together the solutions that improved their life in a dialogue strengthened by the different experiences (Manzini, 2005), in this case, applied to the life inside the prison.

The project, in addition to the concrete solutions, proposed to reinforce the human beings values with the promotion of friendly and straightforward gestures through the stimulation of the awareness in recycling and reuse of waste materials processes. Therefore the benefits were 1) for the students

was a practice of rethinking and re-signifying the materials available to respond to concrete demands; 2) and for the prisoners was a personal rehabilitation, an opening to identify second opportunities and define real possibilities of reintegration

The creative community freely developed in courtyards number five and nine of Colina II Prison -without police or security personnel-. Students and prisoners talked and created together; they contributed ideas, laughed, tested, prototyped and evaluated each result; meanwhile, they are defining a common perspective on recycling and reuse. In addition to the concrete results of the creative process, they created an environment of trust and respect guided by kind treatment.

The methodology

The methodology guided by the model of Design for Change in which was added a final "evaluation" stage (Image 2). For each stage were identified, on the one hand, the constant emotions in the interaction between students and prisoners, and on the other the related activities. The original methodology was adapted to adjust to prison reality. A significant change was the "feel" stage, which spread throughout the process because it is a project that demands high emotionality and vulnerability.

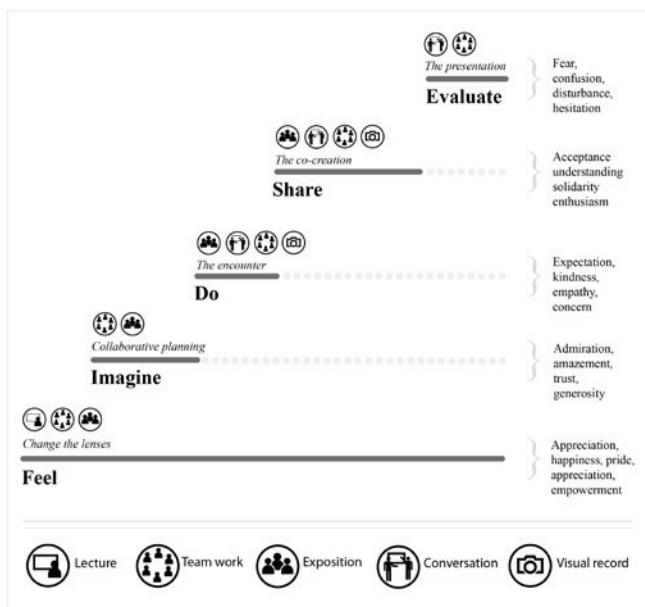


Figure 2: Project methodology inspired by Design for Change. Adapted from Diseñar para la Libertad [Design for Freedom] by M. Kaplún and M. Soto, 2018 Publication of Design School, Pontificia Universidad Católica de Chile p.22-23. Copyright 2018 by Kaplún M. & Soto M.

4. Emotional plasticity

The design students and the prisoners worked on joint proposals to solve problems they identified during their conversations. This integration of both parties in the entire creative process allowed them to get involved -especially the students- in an extreme reality and full of complexities.

Emotions in collective creation

The co-creation depends on those who participate in it, and each one contributes to the process and experience (Prahalad & Ramaswamy, 2004) is a fertile environment for interaction and in which ideas are strengthened from different perspectives. The co-creation provides the opportunity to share and know another point of views especially in the case of the Prison. Students empathised and became involved with those who inhabit the Prison, and the prisoners were able to learn about sustainability and reuse as design processes and how they called it "a way to discover second chances" even for their own lives.

The students and the prisoners at the start of each course expressed their apprehensions. On the one hand, entering the prison and sharing with those who had committed crimes generated great fear; on the other side, receiving the students caused distrust for confronting social prejudices. The work of the team of teachers was delicate and focused on diminishing the emotions that distanced them and allowing them to broaden the perspective that would enable a fruitful and nutritious encounter. The motivation to solve together some problems or propose projects for the benefit of well-being inside the prison was more significant than the differences. At the end of each course, the dominant emotion was satisfaction for the results and sadness because they were closing a cycle of coexistence.

The testimonies of all those who participated in one way or another reflect the emotional intensity experienced. For both institutions, it was an opportunity to unite society: the youngest with the excluded. The prisoners highlighted the learning, the opportunity to obtain knowledge that allowed them to share with their children and for the future as tools to contribute to society. The students expressed that it was an experience that changed their way of understanding the problems of the country and that they glimpsed the real opportunities to contribute to be part of a more integrating society.

Besides, the students defined their learning process as a profound transformation. The majority of students experienced a significant change in their perception in the approaching of prisoners' life stories and an increase in credibility in rehabilitation and value in delivering second chances. Many students said that inside the jail -in the courtyard, without police protection- it was one of the safest places in their lives.

Design as an emotional medium

Each meeting was an opportunity for profound learning in sustainability, reuse and social sensitivity. Court five and nine of the Prison became a permanent workshop of creation and conversation. While they were creating, two worlds were found: "the Prison and the Street" as the prisoners call it, the interior and exterior of the jail knocked down the wall, and without realising it they created a new world without walls.

Therefore, the results not only solved problems within the prison, but they also sought to expand their presence outside the wall, for example reaching their children, and allowing them to create objects to entertain the reception of their visitors.

The students could know one of the most significant motivations of the prisoners: their children. As part of the creative conversations, the need to be present in the formation of their children appeared on many occasions and therefore to design something that would allow them to teach and promote some values. Interesting projects emerged in its preparation and purpose: "Seedbeds for children", are fabrics cases with seeds covered with pulp of paper differentiated by colours extracted naturally from food and with the instructions for the care of the plant; also "Fat Coin [Guatón Moneda]" a piggy bank to promote the value of savings. Or on the other hand "Messenger Bags", made with PVC plastic and containing positive messages created by the prisoners, these bags are used by visitors to enter food inside the prison, and that meet all the security requirements approved by the jail.

A second motivation was to propose improvements to the interior of the Prison, thus arose the "Orchard" (Image 3) built inside the Prison, using organic waste as fertiliser and plastic waste as a structure. This space requires constant care for maintenance and to this day it works. On the other hand "The juicer" and "The centrifuge" created with parts of bicycles in poor condition and empty drums, allowed them to optimise the time of creation of pulp of paper for some of the projects and centrifuge their clothes without the need of electricity. (*These and other projects can be reviewed in the digital version and for now only in Spanish of the book Design for Freedom at https://issuu.com/mariluzsotoh/docs/book-dise_ar_para_la_libertad*)



Figure 3: Orchard inside Colina II Prison created by prisoners and students and currently maintained by the prisoners. Photograph by Mariuz Soto

Designer skills

Part of the training process for design students is to re-sign their preconceived ideas about the different realities of the environment and be more sensitive to them. In the case of work with the Prison that sensitivity went from a simple recommendation to a permanent practice. The first sessions generated an emotional shock in which they faced their prejudices and those who personified them. From the first encounter began a process of discovery, not only for a marginal reality but also to the people behind them, at the same time, they self-discovered their capacity to accept and integrate new values.

Therefore, design students in this specific case developed an adaptation capacity which allowed them to work with the limitations and specific requirements of the place, for example only using materials authorised by the institution. On the other hand, they developed and strengthened the capacity for collaboration in which the challenge was to integrate different perspectives and value innate talents or specific knowledge from each one's living conditions. Finally, and one of the most important, the capacity for empathy, the most significant because it involves a process of profound transformation in the perception of society, diminishing prejudices and making visible the diverse realities that are also part of the same country.

Conclusions

It should be noted that the nature of this paper is explorative and that its results and analysis cannot be considered conclusive. Even so, the article exposes a project that encourages the reflection of the different areas of society and the role of design as a driver of social integration and collective creation as active participation in the construction of a cultural perspective focused on the well-being of all people.

The collective creation proposes an integration's environment intending to know the different forms of life and how the experiences of each can contribute to broadening the vision of society. Creation-guided collaboration allows people to come together with a common purpose, tearing down other situations that could alienate them. In the experience of the Prison, the main wall was the prejudices, and the tool with which it was demolished was the emotions. Design students and Prisoners expanded the frontiers of society. This experience broadens the awareness of a transformation guided by emotional experience and how the construction of common creation environments can influence the change of life perspectives.

Becoming aware of how emotions impact our experiences and how it is expressed through the body and the interactions are essential. Be more conscious of emotions increase a primary responsibility with humanity to promote kindness, compassion and empathy with those who may have different opportunities. Designers with adaptation skills, collaboration and empathy, could expand a logic of creation and realisation focused on the well-being of people.

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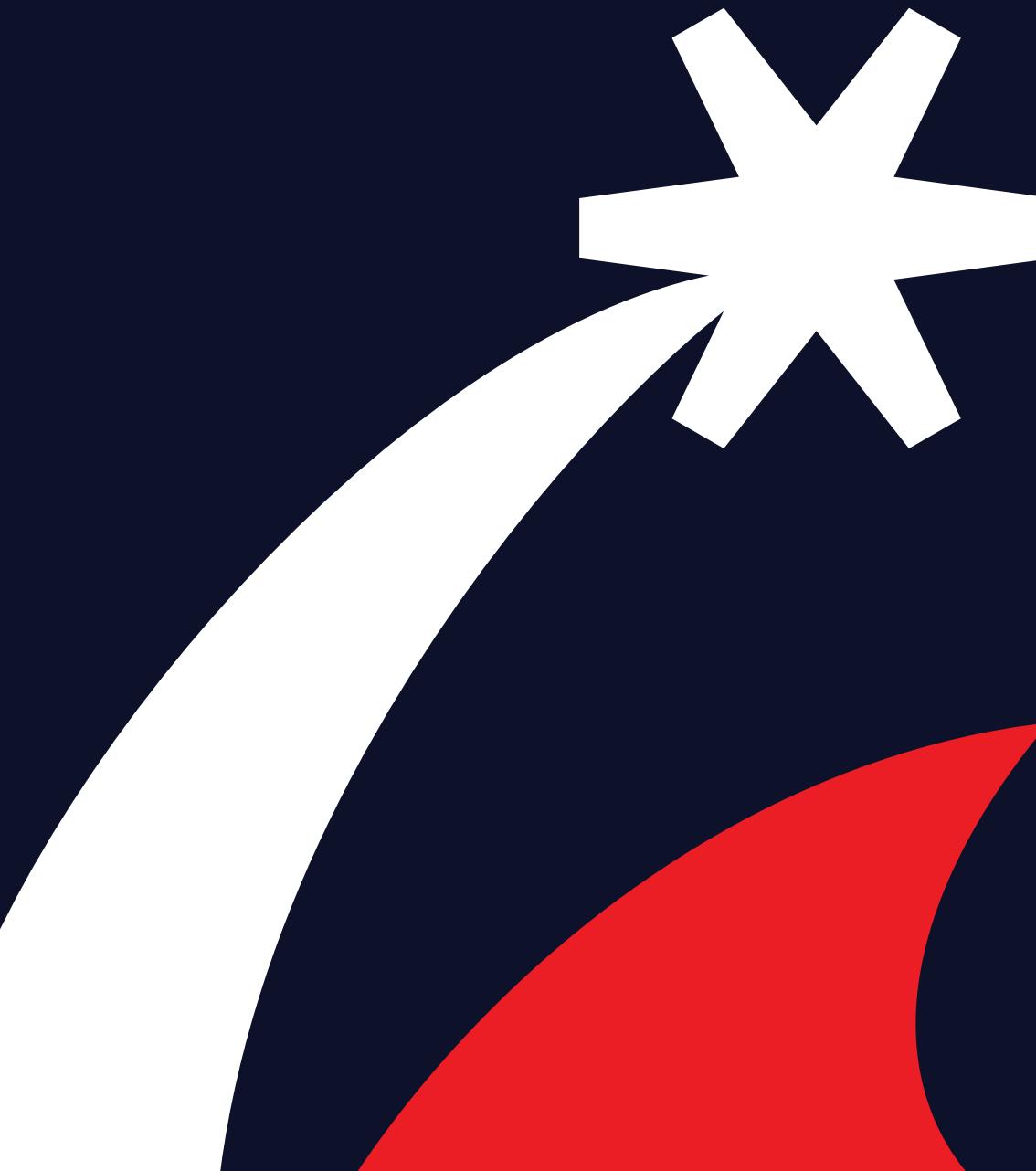
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