
Learning and Sharing in Practices Non-Expert Designers

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Abstract

Everyday design, appropriations, and maker communities have been investigated in the past year in HCI and interaction design to highlight different ways other than typical use to engage with design artifacts. We explore the learning and sharing strategies employed by three groups of non-expert designers: families, hobbyist jewelers, and steampunk enthusiasts. We focus on sharing and learning to demonstrate where and how interaction designers can support these practices of design and making. Our results show that learning and sharing can happen in the most tacit way (e.g. in families) to a more explicit and demonstrative way (e.g. in steampunk enthusiasts).

Author Keywords

Everyday Design; Appropriation; Steampunk; Jewelry; Families; Practice Theory; DIY; Hobby.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, theory.

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Introduction

Amateurs, crafters, makers, and DIYers (do-it-yourself) expressively show an alternative way to engage with, use, and consume design artifacts. More importantly, they show highly creative ways to learn and master strategies for making. Far from the end-user achieving a precise and specific task, these makers are viewed as creative co-agents that actively participate in the design process of artifacts and products.

While theoretically DIY, expert amateur, and everyday design hold a lot in common (creative appropriation of artifacts, non-professional design structure, ad hoc improvisations), in practice the groups can be different.

Paulos [10] uses the term expert amateur and has argued that expert amateurs should be proud to be amateurs. He suggests it is through non-expert experimentations that we can find new ways of engaging with technology in a compelling way. He reminds us that the word amateur comes from the latin amator: to love, to be fond of [10]. This comparison should encourage the HCI and interaction design communities to reflect on what it means to design for professionals or for amateurs. The concept of amateurs focuses more on passion, playfulness, and a love for making. On the other hand, the idea behind DIY is more strongly about the process of making, the projects accomplished, and an alternative to mass production. Conversely, the term everyday designer [21, 22] relates more to the aspects of supporting everyday life with ongoing improvised acts of appropriation. Our aim in this paper is not to resolve the terminology and definitions of each term, but simply to acknowledge that the way we look at these practices can change the way we design for them.

We focus our analysis on the learning and sharing strategies in non-expert design practices because learning is central to using and adapting artifacts. In addition, practices are dynamic; they are evolving and changing, emerging and disappearing over time [14]. How practitioners learn and share aspects of practices directly impacts how the practices evolve. In this study, we aim to describe how learning and sharing happens among different groups of non-expert designers and discuss the challenges this poses to interaction design in supporting the design of technologies that can be part of everyday design practices.

Related Literature

Everyday design

Everyday design qualifies and defines the types of actions that people do to creatively transform and adapt objects in their daily lives. Everyday design happens through 'design-in-use', which is a design that is in situ and in synchronicity with daily actions and routines, and its qualities emerges over time [22]. Moreover, in design-in-use design artifacts are used as resources for creative acts and this high level creativity makes users unpredictable. Appropriation, such as hanging a jacket on the back of a chair, is also an important concept within the theory of everyday design. These actions and uses of design artifacts are not necessarily intended by the designer(s), yet people transform, use, and re-design objects so they become personal [8]. In HCI and interaction design, appropriation [1, 4, 5] has been studied to reexamining the typical construct of the task-oriented user.

Do-it-yourself

Additionally, amateurs and makers have been the focus of research particularly because they challenge the

current consumption model by using a creative and rebellious do-it-yourself approach rather than buying pre-made goods. DIY can be defined as “any creation, modification or repair of objects without the aid of paid professionals” [7] (p.295). In addition, studies of crafts and hobbies such as gardening and knitting [6], do-it-yourself communities [7], hacker subcultures like Ikea hacking [12], inventive leisure practices [23] also highlight the creativity and resourcefulness of individuals who create things outside of the common industrialized production model.

Sharing and Learning

Kuznetsov and Paulos [7] propose that online tools for DIY communities should help manage personal identity in both the physical and digital worlds, that more expressive and less time consuming forms of transferring knowledge should be developed to encourage the sharing of work in progress and not only finished projects. Torrey et al [19] specifically investigate how computer and electronics hobbyists document and share their practices through the making of how-to pages, emails, blogs, and forum as well as face-to-face meetings.

The learning process for how to make things was less explored in recent research in HCI. Torrey et al [18] present how hobbyists consume, search, and find how-to pages. As they note in the introduction, craft knowledge is hard to articulate for less experimented hobbyists because “experts’ skills are deeply embedded in their physical movements and in their history of interaction with materials, making this knowledge difficult to express” (p.1371) [18]. Tacit knowledge and physical relationship to materials in face-to-face learning is important and creates a challenge when

facing online learning, particularly the translation between online information to physical materials and actions. Sharing of knowledge and techniques also happens in physical spaces where hobbyists and amateurs meet. Multiple tools and structures such as local production shops (e.g. Fab Labs and Hacker spaces) support DIY communities.

Our research approach

In this paper, we investigate how non-expert designers grow within their practices, more specifically, how they learn and share techniques and strategies for making. Our aim is to explore this specific aspect of the practices because this is an area that can be supported and influenced by interaction design and HCI. We chose three groups with a wide range of practices so that we could highlight the contrasts and similarities.

One way to better explore these differences is through practice theory, and specifically Theodore Schatzki’s concept of integrative and dispersive practices [13]. In practice theory, practice is the main unit of analysis for social life. It is a routinized type of behavior that combines aspect of body, mind, things, knowledge, discourse, structure/process, and agent [11]. Schatzki [13] distinguishes two poles in the range of practices: integrative and dispersive practices, a distinction that can help further describe and compare practices of everyday designers. Dispersive practices are widely spread across individuals of the population and entail a tacit and almost unconscious knowledge to carry practices such as ordering at the restaurant or doing laundry. Dispersive practices are primarily linked through individuals’ shared understanding of practice, highlighting the importance of intelligibility (making sense of the world) of practices between individuals.

Three groups of non-expert designers: An Overview

Families: Families appropriate and redesign their spaces in order to facilitate everyday activities and routines. Through design-in-use principles, they constantly and creatively change the functions of the objects they use.

Hobbyist jewelers: This group focuses on aesthetic and material aspects of jewelry pieces. They make for the pleasure of making and to share pieces with family and friends.

Steampunk enthusiasts: This is a group with strong skills and competences for making and transforming many types of materials. Their goal resides in imagining and inventing a world where function is visible, materials are expressed and steam is the basic power for any mechanical technology.

Integrative practices, although also tacit, show a more organized and sometimes normalized corpus of knowledge shared between practitioners in a particular group, for example skiers or doctors.

Families bring a perspective on the everyday life and on acts of making and design as part of people's routines [3, 16, 17]. Their practice can mostly be seen as a dispersive practice since most acts of appropriation are generally unconscious and tacit. There are no classes or organizations about different ways of using a chair or how to organize cupboards. This group was important for the study to represent everyday designers who design through design-in-use in order to get by daily activities and routines.

Hobbyist jewelers were chosen because the making and material aspects are central to the hobby. They were also selected because they represent an amateur equivalent to the professional practice of jewelry making and silversmithing. Jewelers can take classes to learn their practice and consult a variety of books documenting different jewelry techniques. This group allows to create a base line that shows a more integrative practice with organized ways of doing.

Steampunks were selected because this group is driven by a philosophy questioning the current consumption model and therefore is likely to show a different view of the *user* [15]. The steampunk subculture re-imagines a world inspired by the Victorian and Edwardian eras, where brass, leather, and wood constitute common fabrication materials and where steam is used as a main power source. Onion [9] writes in the *Journal of Neo Victorian Studies*: "Steampunks seek less to recreate specific technologies of this time than to re-

access what they see as the affective value of the material world of the nineteenth century" (p138). There is no professional equivalent to this practice. This group represents expert amateurs who share a common vision of the world. In this case, we chose a group that had a strong community feeling, installing a more integrative tendency to the practice, without having a professional or 'normal' way of making things.

Based on what we knew about the practices of each group, we expected to see different strategies for learning and sharing knowledge and techniques of making and design. We also believe that these differences can help draw attention to how interaction designers and researchers can consider different types of users, makers, and everyday designers.

Methodology

The study of families draws upon an ethnographic study of four families in East Vancouver, which was conducted in 2005-2006 [20, 21]. We conducted a secondary analysis of this study by reviewing the pictures, videos, and notes from each session with the families to highlight the sharing and learning aspects of the practices of everyday design. The second group includes six female hobbyist jewelers from Vancouver, and Montreal, who were interviewed and visited over one month. Their professional occupations are varied and included a student of applied zoology, an elementary school teacher, and a reporter. All participants make jewelry as a hobby or as a side business to a daytime job. Eight Steampunks were interviewed and visited face-to-face or on skype, in Vancouver, Winnipeg, Toronto and Montreal. Their professions are diverse and include a family doctor, a prop maker for movies, a programmer, and a

psychologist. For the hobbyist jewelers and the steampunks, one of the authors met with each participants 3 times for 90 minutes each time. The data was collected through semi-structured interviews, photographic inventories [2], and video walk-through showing details of artifacts or processes. In addition, some follow-up emails were sent to participants when more questions emerged in the data analysis.

Sharing and learning for families

Learning by doing

For family members, learning happens mostly through evolving systems and rarely from other individuals. Learning through evolving systems entails that systems are built, adapted, and changed, as individuals see what is not working correctly for their own changing situations. Trial and error also happens constantly in these dynamic systems. For example, a couple of participants organized the top of their fridge and a microwaveless shelf with objects of value, important documents, things that need to be away from children, and dishes. Through multiple changes and iterations, objects have migrated, disappeared, and new ones came to these transition spaces. This organization is dynamic, and only trial and error could prove how the system fits and works for the family.

When elements that are part of a system are replaced, individuals re-learn how to use the new elements to fit within the existing system. During the study, another couple received a new fridge and stove. The fridge was higher than the previous one, forcing the family to remove the microwave that was usually on top of the fridge to place it on the counter top. This change required the family to learn how to use less space of

the countertop, but also provided new opportunities for putting things on top of the fridge.

Learning through design-in-use

In general, families rely on fluid and unstructured ways of learning and sharing. Most of the time, the goal of everyday design in families is to continue daily activities by finding improvised solutions to unique problems. Hence, there is no dedicated time to learn or share strategies for doing so, practices of appropriation mostly happens in an ad hoc manner. The design actions taken by family members cannot directly be learned, but the overall resourcefulness and creativity are abilities that can be mastered over time, through a series of doings. The everyday design observed in families is mostly unconscious and can be called design-in-use [22]. This characterization as design-in-use is supported and enhanced with our own observations made about the learning through doing and the lack of sharing techniques for appropriation.

Sharing and learning for hobbyist jewelers

Learning by doing and observing

Documentation, both online and offline, is one of the ways used by hobbyist jewelers to gather inspiration for projects, to learn about techniques or materials, as well as to follow tutorials presenting descriptions of projects. Practitioners combine practicing gestures and techniques, with building their knowledge through observing tutorials, which become more advanced and elaborate. A participant explains that she often is inspired by pieces made by other designers. She spends a great amount of time observing pieces looking for techniques, details, materials, textures, and colors for overall looks. Through her precise and refined observation process, she is able to reverse engineer the

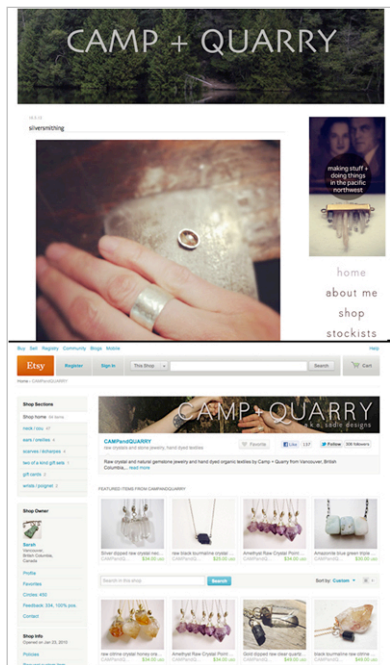


Figure 1: Camp + Quarry Blog and Etsy store.

process for making similar pieces. *"I adopt different techniques that I've learned from others and make it my own."* From there, she experiment and build pieces inspired by the studied ones. She not only replicates the techniques, she adapts them to her tools, materials and skills. Learning techniques through observation lead to transformations in the doing of that practice.

Learning through experimentation is also present in the practice of hobbyist jewelers. Demonstrated by many, the ability to experiment is often at the heart of developing new techniques for jewelry making. For example, this is how in our field notes we described a participant's cycle of iteration and experimentation for developing a way to pierce dried rose buds in order to add a hook: *Allison started to pierce dried rose buds first with a pin, by pushing on it, and turning it, but it did not work very well. So she looked for a different technique to make a good hole in the buds. All of a sudden, she thought about heat. She grabbed a candle, and heated a pin. And it worked. She says: "flash of insight, I just kinda knew. I wasn't sure it was going to work".*

Participants often mentioned that they learned how to craft as kids with their parents. Allison mentioned that her mother is an artist and seamstress, her father a welder, and her grandmother collected crystals and stones. She added: *"I think that my need to make things comes from seeing my mom always sewing"*.

Unidirectional exchange of knowledge

Generally, the sharing of techniques and knowledge is *unidirectional* in the case of hobbyist jewelers. Participants look for information from other jewelers but would not share their own techniques

spontaneously unless someone asked. For some participants, a lack of interest and time prevented them from creating a blog or having an online presence. Online sharing was rarely used in hobbyist jewelers' practices. Only one participant maintains a blog and an Etsy store for sharing her work (figure 1). She uses the blog to share work in progress, inspiration, and reflections about her work and further to receive comments from friends and people interested in her work. Interestingly, she says that she would not share her techniques for making because she feels they are not *"professional enough to share with others"*.

In brief, we have observed that learning for hobbyist jewelers happens mostly through observation of other pieces and through the act of making. As jewelers make pieces, they gain experience and knowledge that will further nourish their practice. Unlike what was expected from this group, there was no sign of taking jewelry classes as a way to follow the more integrative nature of this practice. This suggests that the hobbyist practice has a life of its own that does not necessarily rely on professional techniques. The unidirectional exchange of information we observed shows the awareness of practitioners for the work of others, without committing to showing personal discoveries in many cases. This can be a consequence of the fact that many participants create jewelry for the simple pleasure of making and the relation to materials, without the interest of showing others.

Sharing and learning for steampunks

Learning through experiments

"I don't know I can't make something until I try". Experiments are central to the learning process in steampunk practice. Prototyping, a form of



Figure 2. Prototyping with cardboard before using copper.

experimentation, is a way to learn how to create new pieces. For example, using Bristol cardboard to create a quick version of a glove helps refine the size and shape of the parts and can serve as a pattern for cutting the metal sheets (figure 2).

We also found the acquired skills and love of making were often present at a young age in our participants. Many times, they recalled playing with Lego, making crafts, playing with a soldering iron at the age of 12 and they recognized the influence of their family members. For example, a participant learned how to turn small wood pieces on his grandfather's metal lathe; he remembers building small-scale models as a teenager and describes how he was exposed to arts during his childhood because his mother is an artist.

Online sharing, conventions, and craft meets

Sharing techniques, projects, and ideas is a central focus in steampunk practices, and is, in itself, a motivation for participants to continue making projects. Annual conventions and exhibitions are opportunities for steampunk enthusiasts to meet with similarly minded people and to show off new costumes and gadgets. They are viewed as a place to display creativity with a 'show-and-tell' attitude where people are open and do not mind sharing their own techniques. The variety of skills and competences mastered by steampunk enthusiasts are often learned by sharing with like-minded people at conventions, during panels at conventions, and through online tutorials. For example, a participant learned by talking with another enthusiast, during a convention, how to use the sheathing of a shoelace to sheathe wires in machines to provide a steampunk look.

Conventions include panels where experts show how to make costumes and machines. In a panel called 'Steampunk Gadgets and Gizmos' (figure 3), two participants shared their design process, the tools and materials they use, and answered questions from the audience at a steampunk convention. The steampunk community is also present as smaller groups in different cities such as Toronto, Montreal, Vancouver, and more. Enthusiasts meet for monthly craft meets and book club meetings for example.

The online aspect of the steampunk community is also strong. On active Facebook pages and groups, people frequently use online walls to share links of other projects, materials, tools, and ideas. Individuals share questions about many aspects of prop and costume making in order to get input from other enthusiasts. For example, a participant was looking for a way to remove the manufacturer's stamp on a brass tube. He posted his question and within a couple hours steampunk enthusiasts had replied to use nail polish remover.

In conclusion, steampunks learn from many different sources, through their own doing and making and through the active practice of sharing within the community. Sharing of inspirations, techniques, suppliers, in-progress projects and finished projects can diffuse the knowledge and have more enthusiasts learn about creating steampunk artifacts. This finding relates to the nature of steampunk practice, which is deeply motivated by the idea of realizing a past that never existed. By sharing a vision of this imaginative past among themselves, enthusiasts can shape how others envision this fiction as well.



Figure 3: Steampunk Gadgets and Gizmos Panel.

Discussion: Integrative and Dispersive aspects of practices

Through the description of each practice we recognize certain aspects of integrative and dispersive practice that can help interaction designers better frame how they design to support or allow appropriations and everyday design. As the examples show, there is not a clear categorization of practices, but we can see aspects of integrative and dispersive practices within our three groups.

The practices of families can be seen as a good example of dispersive practices, as we expected. The lack of sharing structures and learning organizations further supports the argument that everyday design in families is more dispersive in nature. Tacit and unconscious knowledge is not easy to share with others or even learn from others. This suggests an interesting challenge for interaction designers who would like to support the transmission of everyday design strategies across families.

We recognize in the definition of integrative practices the practices of Steampunks and to a certain level, hobbyist jewelers. Steampunk enthusiasts have shown a shared understanding of what Steampunk is through the exchange of discussions and images online and at conventions. The constant dialogue around fabrication techniques also demonstrates a more systematic approach to the distribution of knowledge across practitioners. Hobbyist jewelers represent an integrative practice in the way they seek information from others. However, the way they interpret and transform their observations towards their practices are rarely shared again with others.

Implications for design

Skills are learned at a young age

Learning at a young age is apparent in our observations of both practices of hobbyist jewelers and steampunk enthusiasts. Skills like cutting, gluing, painting, and lego building are creative skills learnt during childhood. Designers can leverage these common skills to make tangible technologies more open to transformations and possibly part of the tacit and dispersive aspects of everyday life.

In addition to skills commonly learned early in life, we can rethink the current curriculum. Competences like creative thinking and resourcing materials can encourage more acts of appropriation and making in the physical world. Education about digital fluency and digital literacy can start at an early age and hence become more common and intelligible knowledge shared across the population. An example of a programming tool for children is Scratch¹, a MIT Media Lab project. It aims at empowering children with an easy and simplified language for programming interactive stories, art, music, animations and games. If we want to empower people to apply everyday design to interactive technologies, there is a need to teach basic skills in programming to allow people to modify and transform existing technologies.

Reverse engineering is the norm

Crafted objects bear traces of how they were fabricated. Marks from tools and material qualities give hints to makers as to how the creator of an object built it. In technology, these hints about how a piece was produced are hidden behind seamless black box

¹ <http://scratch.mit.edu/>

designs. In order to allow learning by doing with interactive technologies, we need to start designing for transparency, visibility, and seamfulness, creating handles for everyday designers to start exploring. Our study also shows that learning and sharing happens in the process of doing, with practice and trial and error iterations. Artifacts and systems should allow for various levels of experimentation, from very easy and accessible, to more challenging as the maker gains expertise. The open source movement is a good example that encourages experimentation and sharing of knowledge and project parts. This is also spreading within FabLabs that share 3d drawing files to allow others to create and transform projects. In this case, we recognize the integrative organizing aspect of the practice that helps regulate and standardize formats and files to ease sharing. Can we think about more ways to pursue this model with consumption products?

Sharing happens anywhere and anytime

The sharing of information and knowledge is very different between the three groups and represent both aspects of integrative and dispersive practices. We observe a gradual change from families who do not share outside the home, to hobbyist jewelers who seek out information without sharing their techniques, and finally steampunk enthusiasts who are highly engaged in sharing techniques, inspiration, and ideas with others. Designers can play a role in how we shape the perception and understanding of what is amateur making. We can play down the division between professionals and amateurs in online sharing structures and how we present projects. We can start to think about what an “amateur-friendly” structure could look like, echoing “user-friendly” approaches to technology.

Conclusion

In this paper, we have outlined the strategies for learning and sharing as practiced by three groups of everyday designers: families, hobbyist jewelers, and steampunk enthusiasts. The findings speak to the differences across the cases as well as similarities and raise challenges and opportunities for HCI and interaction design. We reiterate that practices of everyday design are diverse and that designers should promote a space where amateurs are at ease and sharing encouraged. Our contribution lies in the description of those practices, our use of the integrative and dispersive practices framework, but also in how we use these observations to direct future research and design efforts. We propose three areas for future research: 1) revising the education curriculum to include experimentation space for playing with technology; 2) create tools and materials that can express how artifacts are made and that allow different levels of makers to enjoy challenges; 3) provide space and tools for multiple ways of sharing information. Interactive technologies can be a space for learning, experimentation and discoveries for many people. Hopefully, this study can nourish a design process where everyday design is championed and where personal creativity is revived to reconnect with design objects and systems. Our future research will aim at developing simple interactive technologies and artifacts that are seamful and transparent, as well as transformable with basic skills and technical knowledge.

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