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Spaces that Foster and Support Creativity and Collaboration in Art + Design Incubators

Newton D'souza, Florida International University, USA
Asha Kutty, University of North Carolina Greensboro, USA
Tania Torrado, Florida International University, USA

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Abstract: The current need for collaborative spaces has led to the emergence of various innovative place types that encourage the exchange of ideas, skill development, and innovation. Among these, Art + Design incubators have proven to be highly effective in fostering a collaborative and creative culture, bringing together artists, designers, and entrepreneurs to collaborate. While establishing a direct link between physical space and creativity can be challenging, this paper aims to explore the potential of Art + Design incubators in facilitating collaboration and creativity. To achieve this, the research focuses on a case study of a university facility in Miami, utilizing a mixed method approach. The data collection involves journal documentations to identify creative activities within the incubator, activity mappings to track users' locations and movements associated with creative activity, and focus groups to gain insights into how incubators facilitate creativity and collaboration. Considering the growing significance of collaboration and creativity in modern workplaces, the study's findings will have implications for the future evolution of work environments.

Keywords: *Creative Space, Collaborative Space, Art & Design Incubators, Collaboration, Creativity, Innovation, Design Facility, Interior Design, Workplace Design*

Introduction

In recent times, a broad taxonomy of collaborative spaces has emerged. These include business incubators (e.g., Y Combinator), start-up accelerators (e.g., Techstars), co-working spaces (e.g., We Work), maker spaces (e.g., MIT maker workshop), online forums (e.g., Kickstarter), and temporary event spaces (e.g., Hackathons). While these collaborative spaces have varied goals and purposes, Art + Design incubators are unique in their ability to spur the creative class into social entrepreneurship. According to Thom (2015), the fundamental purpose of the incubation program is to help users develop their professional potential and ensure their survival as entrepreneurs. However, the function and capacity of such incubators in facilitating collaboration and creativity are rarely documented, partly because it is a relatively new place type and partly because of the complex nature of collaboration and creativity that occurs within such facilities. According to Lee (2016), one of the reasons for the lack of research is the difficulty in connecting the tangible nature of the physical work environment to the intangible nature of creativity. Lee points out that most studies of workplaces have concentrated on social and psychological factors, such as the office climate, with minimal research done on the role of tangible physical settings in promoting creativity,

such as workplace spatial design qualities. While studies on the role of physical design qualities in fostering creativity is not completely absent, what is inadequate are in-depth studies focused specifically on spaces that are designed for the sole purpose of collaboration and creativity such as Art + Design incubators.

Spaces that Facilitate Creativity

Creativity has been defined as a personal trait (e.g., Barron and Harrington 1981; Guilford 1959; Maslow 1959), as an intellectual or artistic product that is judged both novel and valuable by observers (e.g., Albert 1983; Eysenck 1994; Ford 1996; Glynn 1996; Rogers 1959). Creativity is also considered as a dynamic process involving individuals' interactions with their social environment (e.g., Albert 1983; Amabile 1983; Lasswell 1959; Mead 1959; Mumford and Gustafson 1988; Sternberg and Lubart 1996). However, correlating physical features of the workplace and its impact on social experience of creativity have been limited (Amabile 1983; Fuzi, Clifton, and Loudon 2015; Stokols, Clitheroe, and Zmuidzinas 2002).

A growing number of organizations are interested in adopting nontraditional workplace policies to support flexibility, as well as design strategies to generate the energy of creativity and innovation (Haner 2005). Some organizations value "serendipity" as an integral part of creative collaborations. The article "Engineering Serendipity" by the *New York Times* (Lindsay 2013) reports that firms such as Google and Yahoo attribute some of the best decisions and insights to hallway and cafeteria discussions, meeting new people, and impromptu team meetings. In its new campus at Mountain View, California, Google considers bent rectangular forms as an effective strategy to maximize "casual collisions of the workforce." Similarly, Stanford University's Institute of Design has implemented simple measures such as positioning couches near doorways and stocking rooms with multiple types of seating to encourage lingering conversations (Lindsay 2013). Gordillo's (2008) findings confirm the importance of providing meeting points (coffee machines, kitchen areas, and watercooler) at strategically central locations or offering "collaborative architecture" (shared tables, lounge areas with couches, and conference rooms). While these studies point out to some initial insights into research on "serendipity," the role of physical and environment and space is still at a nascent stage.

The Steelcase Inc. furniture company has in recent years conducted some research on creativity and innovation at the workplace with interesting reports such as "the creative shift" (Steelcase 2017) and "inside innovation" (Steelcase 2018). These reports point out the effects of posture on the brain, and the impact of social interaction on creativity within the context of Steelcase's furniture concepts. Other companies such as Knoll have addressed the rise of co-working spaces through a study of worker preferences (Roth and Mirchandani 2016). The design firm Gensler attempted to understand the role of design in employee performance and innovation (Gensler 2016) and identified four modes for successful work performance: focus work, collaboration, learning, and socializing (Gensler 2008).

Some studies have attempted to investigate specific design features that might be associated with creative thinking. Based on an exhaustive literature review, Thoring (2019) has attempted to identify design features or spaces that facilitate creativity and well-being. Thoring defines creative spaces as physical structures and elements at different scales that are deliberately designed to support creative work processes or to facilitate creativity and innovation. In conclusion, she outlines a variety of abstract requirements and concrete characteristics/ configurations for creative spaces as outlined in Table 1.

In one literature review focused on team creativity, several physical factors were identified to be associated with team and organizational creativity (McCoy 2005). These include the following:

- Spatial organization (focused activities, privacy, autonomy, multiple workspaces, flexible and adaptable spaces, and space size).
- Architectonic details (cue-rich environment through design elements shapes and forms, wayfinding, colors, artwork, and space personalization).
- Views (to nature and daylight).
- Access to resources (facilities, equipment, information, technology, funds, and people).
- Ambient conditions (acoustics, lighting, thermal comfort, and air quality, affecting sensory systems).

In a more targeted study on the role of interior design on creativity, McCoy and Evans (2002) identify interior design elements rated high or low in creative potential. Using a photographic structured Q-sort technique, they queried participants on their perception of spaces that were found as most creative and least creative. Independent raters then conducted a content analysis of these photographs to scale each setting according to size, shape, light, internal organization of objects, and characteristics of bounding surfaces. They finally outlined a list of physical features correlated to creative potential (Table 2).

In a broader study, D'souza, Kutty, and Mehrhoff (2015) identified spaces that enhance creative thinking in the learning spaces of college campuses. Based on Mihaly Csikszentmihalyi's (2008), pioneering research on leadership and creativity they examined the ways in which informal learning spaces supported the creative learning of student leaders. The study identified a range of space choices from cafes and atrium spaces to private dorm rooms. Some design qualities were preferred over others, including movable chairs, ability to slouch, alcoves, private rooms, access to amenities such as high-tech devices (printers, computers, food/beverages, toilets), and natural elements (sunlight, large windows, shaded trees).

Table 1: Creative Space Features (as adapted from Thoring, 2019)

Abstract requirements of a creative Space	*Concrete characteristics and configurations of a creative space*	*Description*
Social Dimension, Chance Encounters	Geographic location	Neighboring businesses or institutions provide contacts
Stimulation, Ambiance	Milieus	Neighborhoods attract creative people
Knowledge Processing	3rd place	Café, home, train, etc. as workplace alternative
Process Enabler, Affordances, Infrastructure	Remoteness	Dislocation from daily routine provides autonomy
Engaging Space, Activate Participation	Field Access	Mobility allows easy access to user and supplies
Comfort and Ergonomics	Changing Locations	Change of perspective
Health and Safety	Outdoor Spaces	Nature, surrounding garden, access to fresh air
Surprising, Unexpected Space	Open Space	Open plan office instigates communication and stimulation
Flexible Space, Changeability	Spaciousness	Large space provides “space for thought”
Culture of Space, Reflect identity, Symbolic Aspects	Proximity	Short distances enable collaboration and meetings
Ownership of Space	Open Views	Windows to nature, sky, outdoors
Accessibility	Vistas	View in between and across rooms; eye contact and stimulation
Facilitator, Assistant	Semitransparency	Visual privacy, curtains, lamellas; protection with peeks
Additional Services (events, expertise’s, etc.)	Reduce Interior	White or empty room leaves space for creative ideas
	Complex Shapes	Moments and textures are visually stimulating
	Unconventional Architecture	Asymmetry, curved walls, dead spaces; can trigger creativity
	Buzz	Busy atmosphere, chaos, aliveness
	Theme Park	Interiors resembling space stations, cable cars, yurts, or igloos.

	Greenery	Indoor plants, green areas, nature imagery on wallpaper
	Gallery	Observe others without disturbing
	Central Meeting Space	Theater-style auditorium, forum for intense group meetings
	Face-to-Face Meeting Space	Shared rooms or 2-by-2 seating arrangements for intense talks
	Informal Lounge Area	Sofa, hallway seating for casual meetings
	Cozy Capsule	Booths, small room-in-a-room for personal withdrawal
	Flex Desk, Hot Desk	Flexible workspaces instigate new connections every day
	Personalized Space/items	Assigned workspaces or objects allow for personal expression
	Café, Kitchen	Hub for casual meetings
	Writable Surface	Displayed knowledge and visual thinking on whiteboards.
	Anchors	Attractors or spatial bottlenecks instigate change encounters
	Information Access	Book library or access to digital sources
	Technical Infrastructure	Wi-Fi, rapid prototyping, printing, electronic brainstorming etc.
	Access to Equipment	Materials and tools are available and how to use them
	Visual Inventory of Tools	Computer games, table tennis, etc. for inspiration and distraction
	Toys and Games	Sports facilities to workout
	Gym	Hammock, beanbag, etc. indicate that casual breaks are permitted
	Unusual Furniture	High chairs or swivel chairs enforce bodily movement
	DIY Style	Old furniture and rough materials instigate experimentation
	Communal Table	Shared desks; work in company but not necessarily together
	Interim Showcase	Exhibition of project work or models, e.g. combined with storage

Table 2: Environmental Characteristics of Physical Settings That Influence Creativity Performance (as outlined by McCoy and Evans, 2002)

High Creativity Potential	*Low creativity Potential*
Spatial complexity	Cool color temperature
Visually detailed	No view
View of natural environment	Manufactured/ composite material
Use of natural material	
Sociopetal design	

A global study on coworking spaces conducted by Fuzi, Clifton, and Loudon (2015) emphasized identity and location as vital factors for creative spaces. In the study, the aspect of identity was reflected in the neighborhood and the composition of the co-working space and its members (e.g., Bohemian or techy type of personality and business). In every case, the space's location was found critically important, with every area situated close to public transport and easily accessible by car or bike in attractive neighborhoods with cafés, bars, and art centers. Fuzi, Clifton, and Loudon (2015) demonstrate that each coworking space in the study has its personality with predominant design elements being flexibility, comfort, reliability, and belonging. According to Landry (2012), the twelve most creativity-encouraging themes for co-working spaces are daylight and view, work surfaces, personal items, privacy, collaboration, ergonomic furniture, multiple work/play areas, artificial lighting, nature, air conditioning, décor, and color.

In summary, the literature reveals that physical features of workplaces can influence creativity, with serendipity and social interactions playing significant roles. Studies by Steelcase and other companies highlight the impact of posture, social interaction, and design on creativity. Specific design features that facilitate creativity and well-being include flexible spaces, spatial organization, architectonic details, access to resources, and ambient conditions. Interior design elements like light, shape, and organization also influence creative potential. Informal learning spaces in college campuses support creative learning through movable furniture, access to amenities, and natural elements. Coworking spaces promote creativity through identity, location, flexibility, comfort, and collaboration. Overall, the research underscores the importance of physical spaces in fostering creativity and innovation. The existing literature on the relationship of physical spaces and creativity has focused on serendipity, ergonomics, employee performance and well-being as a part of corporate firm reports. More targeted studies have attempted to link creative potential and team creativity to specific physical factors. Features such as flexibility, location and easy configuration of furniture seem to be recurring themes.

Nevertheless, there is a scarcity of studies on collaboration, creativity, and space design, as well as a lack of in-depth investigations into how physical spaces nurture creative thinking. This study aims to examine the impact of design elements on collaboration and creativity by mapping the creative process over time. The objective is not to establish causal connections

between creative events and space but rather to comprehend the relationship between them. Hence two research questions are posed:

i. To what extent do Art + Design incubators afford collaboration and creativity?
ii. What specific elements or systems in the interior environments of Art+Design incubators are correlated to collaboration and creativity?

Art+ Design Incubators as an Emerging Place-Types

In the context of the study, it is important to understand the reasons for emergence of Art + Design incubators as targeted facilities for collaboration and creativity. Since artistic professionals in the creative field do not have explicit training in business, Art + Design incubators were conceived as "incubators" of entrepreneurship creative fields. The National Business Incubation Association (NBIA) considers that incubators nurture young firms, helping them survive and grow during the startup period when they are most vulnerable.

Thom (2015) points out that fine artists need to meet multifaceted challenges and operate like entrepreneurs to make a living in the arts. He points out that while artists' art-specific professional talents are typically excellent, they often lack the complementing business skills required to fulfill market demands successfully. According to Thom (2015), there hardly exist any full-time and permanent employment opportunities for fine artists in the arts, only opportunities to pursue work on a freelance and self-employed basis. For this reason, arts incubators are able to assist artists in further developing their skill sets, recognizing and realizing art business potential, and increasing their chances of attracting market attention. Incubators provide hands-on management assistance, access to financing, and orchestrate exposure to critical business or technical support services. Most incubators offer shared office services, access to equipment, flexible leases, and expandable space at the user's convenience.

Although incubators and coworking spaces can be perceived as a new trend, these work settings are not entirely new. For example, Montanari (2019) noticed two important co-working spaces from the nineteenth century. The first was Thomas Edison's Invention Factory, an open floor laboratory dedicated to developing creative ideas. The second was the Homebrew Computer Club, which dated to the 1970s and 1980s. The club hosted meetings between people from distant fields, such as hippie anti-war activists or Stanford-graduated engineers. In sum, the incubator was a hotbed for people interested in the birth of the personal computer revolution.

While incubators incorporate an environment of co-working, they can also be distinguished from conventional co-working spaces. Incubators differ from conventional co-working spaces because the primary goal is to mentor members with entrepreneurial thinking and skills while launching ventures. Essig (2014) suggests that an incubator venture does not have to succeed for the learning outcomes to be met. Incubators are subsidized by governments as part of governmental efforts to support entrepreneurship in economically challenging periods. Therefore, the economic success of the ventures is not the determinant

factor of the incubator's success. In essence, incubators foster the cross-fertilization of ideas through collaboration, experimentation, and multidisciplinary practices. In other words, Art + Design incubators are a creative milieu where artsy people, strangers, can come together with few inputs and begin to form friendships while pursuing creativity and productivity (Fraser et al. 2014). Self-employed freelancers and micro-businesses mostly need collaborative community workplaces. The rapid scale growth of these communities indicates that "new generational environments" that foster social interaction, flexible working, and professional engagement will be needed in the future (Fuzi, Clifton, and Loudon 2015).

Diversity is a vital part of incubator spaces. Fuzi, Clifton, and Loudon (2015) found that incubators that offer a wide range of skills and expertise are highly valued because they provide fertile ground for serendipitous interaction and learning opportunities from different perspectives.

The concept of business incubation for the arts was first put into practice in 1987 by a Chicago-based consulting firm whose clients included emerging arts groups and a small cadre of arts administration and faculty development professionals. Since the establishment of this pioneering incubator, called Arts Bridge in Chicago, numerous arts incubators have been established as private nonprofits, initiatives of community development plans, extensions of city cultural affairs departments, and programs affiliated with universities or colleges (Gordillo 2008).

In their brief evolution as an emerging place type, Art + Design incubators have taken on many different forms in response to available resources and the needs of the constituents they serve. As a result, no set model is adopted. Instead, arts incubators adapt and devise organizational standards and approaches that fit the particular arts ecology in which they operate. Based on the business incubator model, an arts incubator can be a facility, policy, or combination that creates a nurturing environment for emerging artists, arts groups, and arts services.

In summary, Art + Design incubators have emerged as targeted facilities for collaboration and creativity, providing support and mentorship to artistic professionals who often lack business skills. They nurture young firms and help them survive and grow during the vulnerable startup period. Incubators offer hands-on management assistance, access to financing, shared office services, and flexible leases. These spaces foster cross-fertilization of ideas through collaboration and experimentation. Diversity is valued in incubator spaces, as they provide fertile ground for serendipitous interactions and learning from different perspectives. Art + Design incubators have evolved in response to their constituents' needs and do not follow a set model but adapt to their specific arts ecology.

Methodology

The research design consisted of a mixed method technique using activity mapping, focus groups and journalling focused on a specific case-study of an Art +Design incubator in Miami. Activity mapping documented the activities and patterns of movements of users in relation to

creativity. The journaling exercise documented creative events and was used to check whether there was an association between creative activities and incubator space usage. Finally, a focus group was conducted to get general insights into creative activities within the incubator.

Activity mapping technique was used to identify location and movement of participants and their interior space usage. Cameras help detect and track activities automatically and non-intrusively. Since student fellows participate in incubator activities on a semester basis, the peak activity of the incubator at the mid-semester was chosen for activity mapping. This general activity mapping lasted six weeks. Participants were also asked to document their activities in a journal to get more in-depth insights into their creative process. These journals were restricted to a shorter timeline so a more micro-level analysis could be conducted. The journaling lasted three weeks.

The case study consisted of a university-based incubator in Miami which aims to promote and foster social entrepreneurship and innovation among upcoming University artists and designers. Established in 2017, the incubator's one- to two-year residency provides incubator fellows with essential tools to turn their ideas into profitable businesses. The incubator's mission is to bridge the gap between creative practitioners and entrepreneurial success while promoting innovation within the university community. The core program offers one to two-year fellowships to students, within a socially conscious, co-creative, mentorship, and mindset focused environment.

Student fellows are selected from a variety of disciplines such as fine arts, architecture, interior architecture, communication, business, music, and public affairs. The incubator consists of mentors that operate their own on-site studios, mentor the student fellows, and oversee business developments or patents. The incubator connects to Ally-Big network in New York, which facilitates further mentor outreach and meet-up. Some of the projects undertaken by fellows include book design, design and production of jewelry, experimental music, socially conscious fashion branding, social networking, custom furniture branding, and the use of art for mental health, among others.

The layout of the incubator consists of an open plan layout akin to a "fish tank," which allows for visual and operational transparency that is aimed at serendipitous meetings. Incubator facilities include a collaborative space for fellow students, mentor offices, a dirty room (maker space/ fabrication), a small conference room, a kitchen pantry, a foyer, and a lobby. Faculty spaces are set up like a branded store that also seeks to facilitate faculty start-ups.

Participants

Initially, eleven users participated in the study. However, only seven participants were able to complete the journals and participate in the focus groups, which included six fellows and one mentor. Among these participants, there were two art majors, one music major, one mass communication, and one architecture major. The mentor was affiliated with the arts discipline. The general activity mapping included approximately fifteen users including three mentors.

Activity Mapping

The goal of activity mapping was to capture locations and movement patterns within the incubator spaces that might be associated with creative activity. Activity mapping is the process of acquiring and coding information about the relative location and attributes of the physical environment. The activities were captured using cameras that were installed in strategic locations within the incubator to record the location and movement activities. Although this was an intrusive method, cameras were preferred for their low cost and quick downloading of information. The activity mapping was conducted retrospectively by the investigator based on the camera recordings. Using a base map of the incubator, each individual participant's movement and locational patterns were observed and drawn using a tracing paper. These were then aggregated into a single map (Figure 1). Different color codes were used to distinguish between fellows, mentors, and outsiders. The analysis was conducted in three parts. Part 1 (3 weeks): recorded activities of only those participants who only conducted the journaling exercise; Part 2 (3 weeks): recorded activities of all participants pertaining to the dates recorded in the journals: Part 3 (6 weeks): recorded activities of all participants. Observations charts were created to record instances of specific activities per day and respective behavioral observation notes were documented.

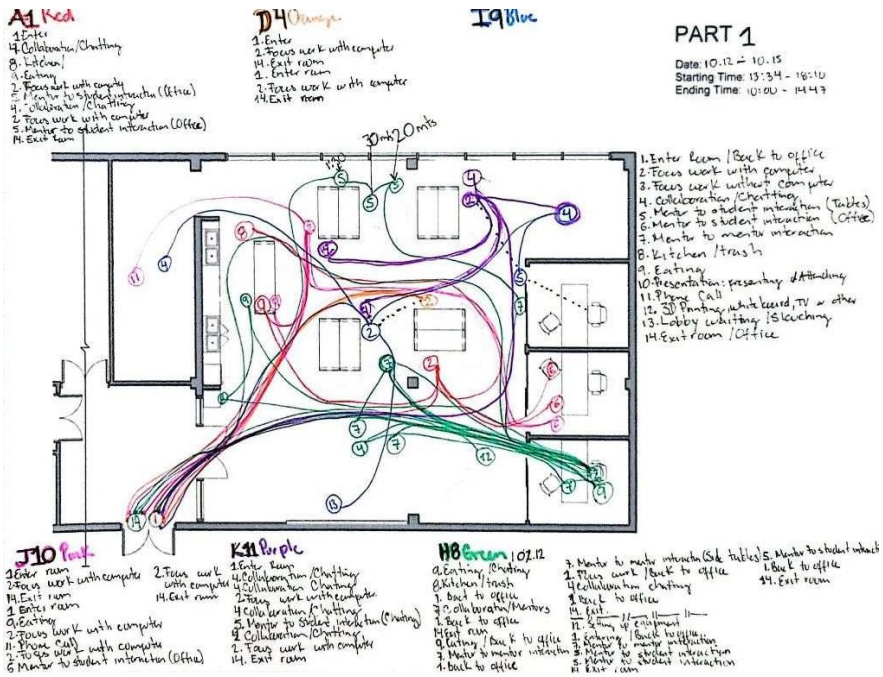
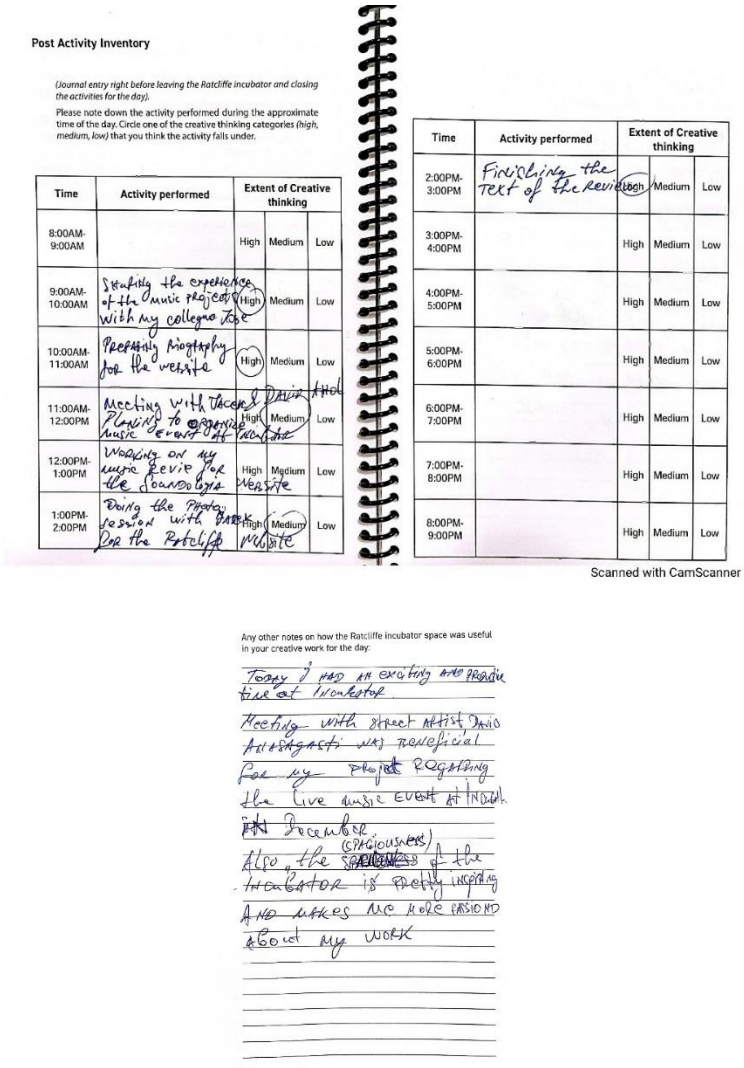


Figure 1: Example of an Activity Map and Observations

Journal Documentation

Participants were asked to keep a journal documentation of their daily activity for three weeks. The journal documentation in the form of user self-report identifies creative activities within the incubator. Each participant was provided with a journal to enter activities for the day and were instructed to be completed at the end of each day. The journal entry took about approximately fifteen minutes every day for a period of three weeks (Figure 2: Journal Sample). Participants were instructed to document specific activities they conducted each day, the time within which these activities were completed, and the extent to which they rated these activities as "high creative activity," "medium creative activity," and "low creative activity." These categories of creative activities were then converted into a raw score index.



Post Activity Inventory

(Journal entry right before leaving the Ratcliffe incubator and closing the activities for the day).

Please note down the activity performed during the approximate time of the day. Circle one of the creative thinking categories *(high, medium, low)* that you think the activity falls under.

Time	Activity performed	Extent of Creative thinking		
8:00AM-9:00AM		High	Medium	Low
9:00AM-10:00AM	Starting the experience of the music project with my colleague Jose	(High)	Medium	Low
10:00AM-11:00AM	Preparing biography for the website	(High)	Medium	Low
11:00AM-12:00PM	Meeting with Jacob Planning to organize music event at the site	High	(Medium)	Low
12:00PM-1:00PM	Working on my music Revie for the Soundbyte website	High	Medium	Low
1:00PM-2:00PM	Doing the Photo session with Barb for the Ratcliffe website	High	(Medium)	Low

Time	Activity performed	Extent of Creative thinking		
2:00PM-3:00PM	Finishing the text of the review	(High)	Medium	Low
3:00PM-4:00PM		High	Medium	Low
4:00PM-5:00PM		High	Medium	Low
5:00PM-6:00PM		High	Medium	Low
6:00PM-7:00PM		High	Medium	Low
7:00PM-8:00PM		High	Medium	Low
8:00PM-9:00PM		High	Medium	Low

Scanned with CamScanner

Any other notes on how the Ratcliffe incubator space was useful in your creative work for the day:

Today I had an exciting and Productive time at Incubator

Meeting with street artist David Arbogast was beneficial for my project Registering the live music event at Indie December

Also, the (CAPACITY) of the Incubator is pretty inspiring and makes me more passionate about my work

Figure 2: Journal Entry Indicating the Levels of Creative Activities

Focus Group

Due to COVID restriction, the focus group was conducted through a remote modality using Zoom and was moderated to receive a free-flowing conversation on the incubator experience. Focus groups were used to provide general insights into the use of incubators in facilitating creativity and collaboration. Focus group is a group interview that is semi-structured. Seven participants participated in the focus group. Four of them attended the Zoom session while three answered those questions through an online questionnaire retrospectively. The focus group was transcribed and then analyzed through an interpretive analysis method using open coding and focused-coding technique. The questions in the focus group included the best places conducive to creative work, places that were not conducive for creative work, and the extent to which digital technology played a role in the functioning of the physical incubator space. In the focus group, each participant was also asked to identify adjective words that best expressed the incubator space in their experience.

Findings

Incubator as a Creative and Collaborative Interface

The incubator locations consist of the foyer, lobby space, mentor room, mentor hallway, fellow center space, fellow window space, print room, kitchen, print room, and 3D printing room/conference (Figure 3). As seen in Figure 4, the analysis of the activity mapping and the focus group showed high patterns of activity in the fellow central space (red box) and the mentor area (orange box). Fewer activities were recorded in the lobby and print areas. Among all the spaces in the incubator, most instances of activity were recorded in fellow central spaces (54%), followed by mentor room (19%). and the kitchen areas (12%) (Figure 5). These findings were expected given the size of spaces and the nature of the interaction. However, surprisingly, fellows chose to stay away from the window space contrary to studies that show daylighting as an important spatial quality for creative thinking. It is possible that the spaces next to the windows did not provide additional benefits compared with the interior spaces in terms of furniture configurations, or that it obstructed daylighting to flow in the central space that might have compelled them to use the space.

The activity mapping showed that the incubator space was used for three main activities: focused work, collaboration, and mentoring (Figures 6, 7). Mentors and fellows spent an average of three hours in the incubator. However, fellows frequented the incubator usually on a Friday since they had to attend other courses across the university during the week. The detailed activity mapping identifies major activities in the incubator in relation to the location, which include focused work, collaborating, mentor-student interacting, eating, mentor interacting, calling on phone, presenting/lecture, and waiting. Among all these activities, most instances were recorded for focused work (30%), collaboration (24%), and mentor-student interaction (17%). It was interesting to note that focused work received

additional attention in the incubator space given the emphasis on social collaboration. Focused work was observed in the fellow central space, specifically in the side tables and usually lasted up to one hour of interrupted work. While most focused works occurred in a seated position, major part of the interactions consisting of mentor-fellow, and mentor-mentor happened in standing positions (Figure 8). Mentor-to-student interaction lasted anywhere from ten minutes to an hour and half.

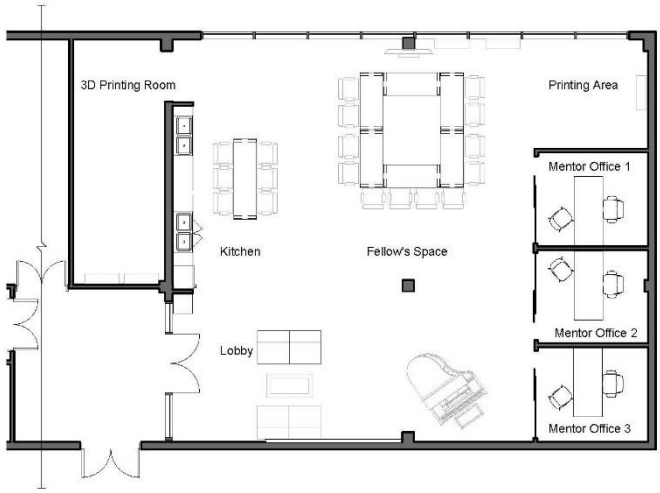


Figure 3: Incubator Space

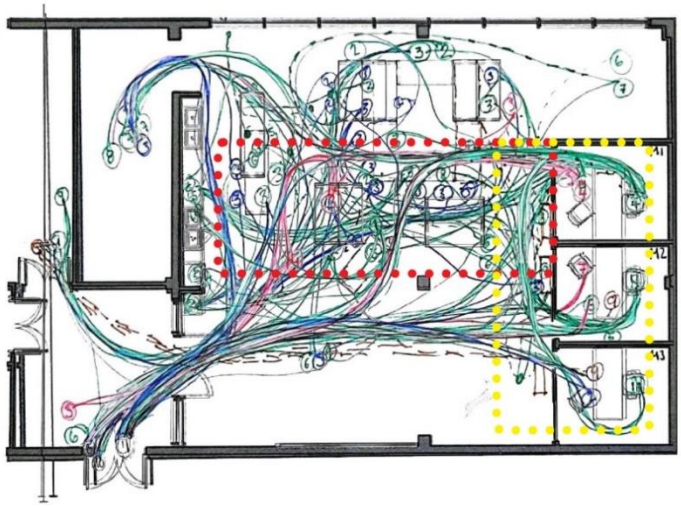


Figure 4: Detailed Activity Mapping Shows High Patterns of Activity in the Fellow Central Space (Red Box) and the Mentor Area (Orange Box)

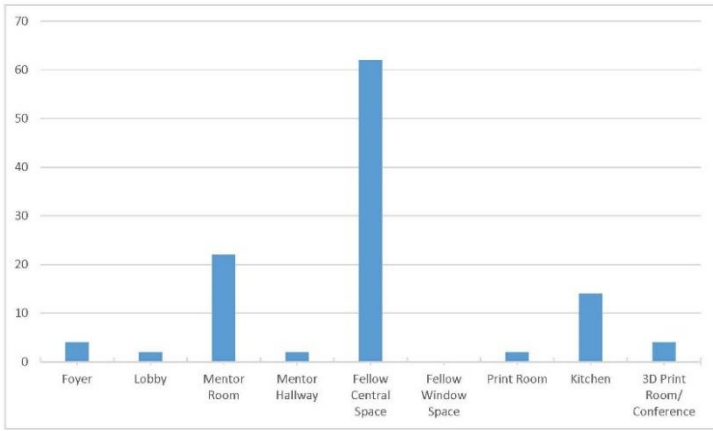


Figure 6: Most Activities in the Incubator Occurred in the Fellow Central Spaces and Mentor Rooms

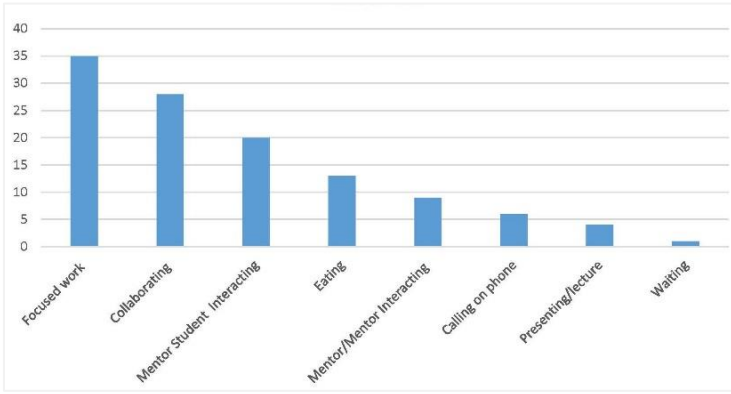


Figure 7: Focused Work, Collaboration, and Mentor-Student Interactions Were the Most Prevalent Activities

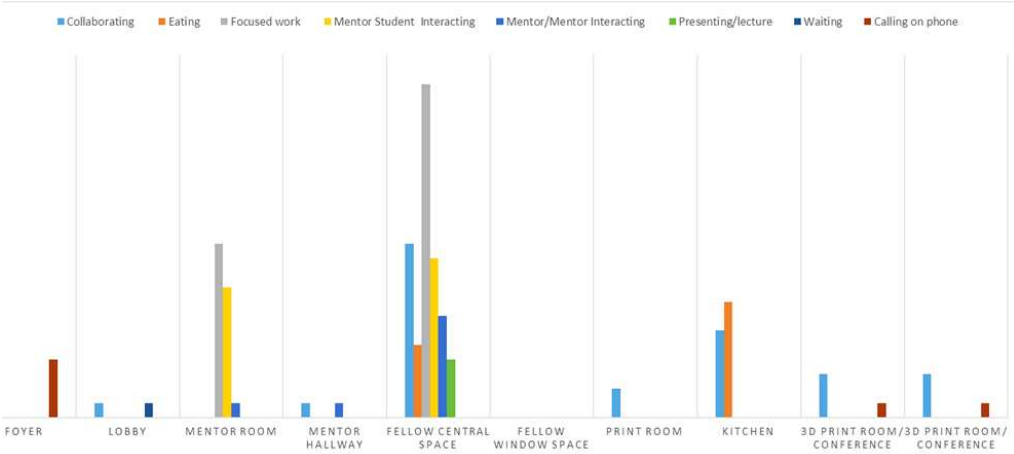


Figure 7: Most Mentor-Fellow Interactions and Collaborations Occurred in the Mentor Room and Fellow Central Space

Figure 8: Detailed Activity Mapping Shows High Patterns of Activity in the Fellow Central Space (Red Box) and the Mentor Area (Orange Box)

Incubator Image and Creative Affordance

As per the journal documentation, activities that were associated with "high creative thinking" included brainstorming, discussion participation, presentations, mentor sessions, research, design thinking, conversation with peers, music project experience, drafting, reviewing, and branding. High creative events also involved introspection about discovering new paths and "seeing the big picture." Mid-level creative activity included computer work, chatting, listening, teaching, meeting, organizing, photographing, and conversing. Low-level creative thinking included eating, setting up, collecting, and inventory making.

It is important to mention here that the participants expressed that creativity had multiple dimensions and varied ways of expression such as individual, collective, social communication, and artistic creativity. They expressed the need for the incubator to be flexible enough to facilitate these different types of creative activities. Some creative work required social interaction, some were done solo, while others involved writing and researching in a quieter space.

When correlations were done between activity counts (from the activity mapping observation chart) and the creativity index (from the journal entry) positive correlations were found for two major spaces: Foyer (0.54) and mentor room (0.47; Figures 9–10). This was reflected in the focus group findings that most users expressed a positive image of the incubator in describing it as a space of connection, welcoming, eclectic, free, and creative, thought, inspiring, and facilitating professional development. Some inspiring moments of incubator experience were captured in the journal documentation such as: "being in Greg's office…. ideas flow… when in the presence of a genius;" "buoyant atmosphere today, nice chatter, donuts"; and "everyone was engaged."

Corroborating the importance of mentor space for creative inspiration, high traffic was observed in the mentor offices and the threshold area (i.e., the phantom corridor between the fellow and mentor spaces). Because the mentor offices were physically "transparent"

consisting of glass walls facing the fellow central spaces, this hallway acted as a private-public space of interaction and a shopfront display to the mentors (Figure 11). The transparency of the offices allowed the mentors to demonstrate their unique identity through the personalization of the display office space façade becomes an active display where several promotional events occurred and an unsaid rule of "festooning" the spaces based on mentor personalities. Fellows expressed that the transparency and display allowed them to see the "human" side and unique personalities of mentors. They perceived some mentors expressing an antique style, some being practical, some having affiliation toward archiving and others as graphically artistic. The mentor rooms were also used to have confidential and more personal conversations.

The "openness" of space was considered both an asset and a liability. The openness afforded seamless interaction, variety of furniture configuration, generous space for presentations, and access to unobstructed daylighting (Figure 12). Rolling tables and light furniture were useful to create different furniture clusters easily (Figure 13). In a sense, the openness of the space allowed an autonomy of walkability, in case someone needed to interact with others. It also facilitated long-distance conversations without having to move closer to their peers. While daylighting was a positive asset of the incubator, not much activity was recorded in the fellow window spaces, except for the occasional times when they were used to gazing outside or taking a breather. The users expressed how the natural lighting allowed them to cultivate creative thinking but the artificial was fell too intense.

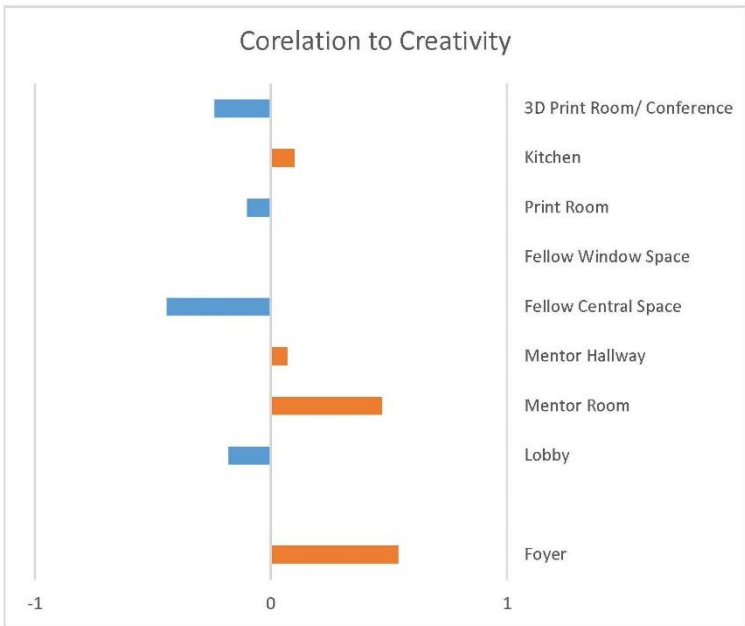


Figure 9: Correlations Done Between Activity Counts (from the Activity Mapping Observation Chart) and the Creativity Index (from the Journal Entry) Show Positive Correlations for Mentor Room, Hallway, Foyer, and Kitchen Spaces

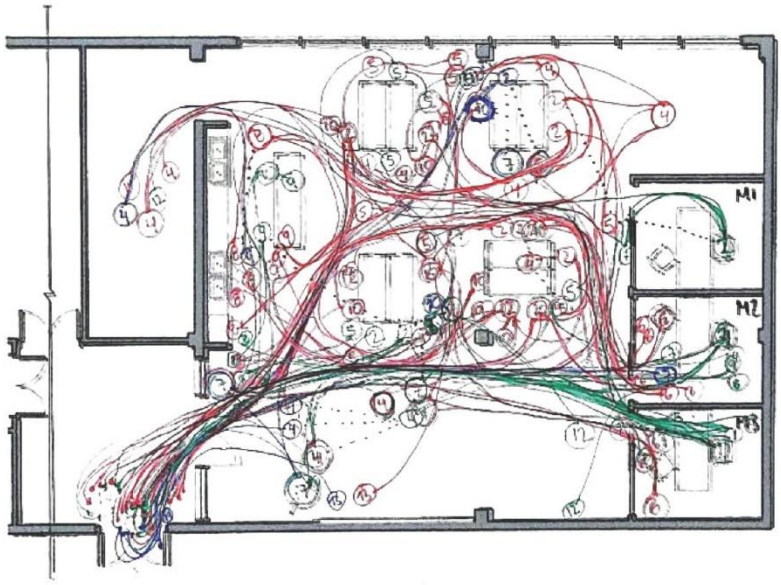


Figure 10: Activity Mapping of All Participants during the Dates When the Journals Were Written Show the Varied Intensity of Activities for Fellows (Pink), Outsides (Green), and Mentors (Violet)

Figure 11: The Transparent Offices of Mentors Made Up of Glass Walls and Facing the Fellow Central Spaces Acted as a Private-Public Space of Interaction as Well as a Kind of Shop Front Display Windows to the Mentors. The Mentor Rooms Provide Opportunity for Self-Identity and for More Private Conversations to Occur

On the other hand, negative correlations were found with fellow central space (-0.44) reflecting some of the user perceptions that emerged out of the focus groups showing the central fellow space was a barrier to creative thinking. These barriers included acoustical privacy and the inability to have more intimate spaces. Some users expressed that since the space was used by a multidisciplinary group of users, finding the right programming of spaces was a challenge. Because most of the spaces were in the "hot desking" format, the lack of dedicated spaces created a lack of ownership. Others considered the incubator to be underwhelming, too pristine for "messy" nature of creativity. In other words, the space appeared too manicured, too clean and tidy and did not feel lived in. Consequently, there

was a sense of reservation to do "messy" physical work that might have impeded collaboration and creativity. There was also the grievance toward not having 24/7 physical access in the incubator that allowed for creative thinking to happen without time constraints.

While users expressed the sense of openness that allowed for brainstorming and verbal sharing of ideas, it was not suited for personalized work. The acoustical barriers prevented multiple conversations from occurring simultaneously. This issue in part was exacerbated by the high degree of hard reflective surfaces within the incubator. Some fellows felt lost in the openness and expressed smaller booth like spaces that could be used for defined activities such as painting, craft making, and music. One way the users counteracted the open space was to use the 3D printing/ conference room for taking private phone calls or to escape from the overt social nature of the open space. On occasions, students gathered for collaboration in the printing area next to the mentor's offices. The lobby area was used only for limited side conversations and usually occurred while standing.

Other users felt that the openness had a sense of "being watched or on display." Reservations were expressed on how openness could create some intellectual property issues when a product is still in the process and be able to be seen or emulated by others. We found it interesting that traditional brainstorming or collaborative tools such as whiteboards were barely used.

Figure 12: Incubator Looking toward the Mentor Offices. The Openness of the Incubator Spaces Afforded Seamless Interaction, a Variety of Furniture Configuration, Generous Space for Presentations, and Access to Unobstructed Daylighting. However, the Openness of Space Also Created Some Barriers in Terms of Acoustical Privacy and Ability to Have More Intimate Spaces

Figure 13: Openness of the Central Space is Seen as Conducive for Variety of Furniture Clusters and Modes of Interaction. Rolling Tables and Light Furniture Were Useful to Create Different Furniture Clusters Easily

The users also had a mixed reaction toward the kitchen area which opens into the central open space (Figure 14). It was used as a hangout space for brief conversations and usually, these conversations occurred in a standing position. The kitchen and trash area received moderate traffic. While most mentors tended to eat at their offices, the kitchen high table was used for breakfast and short conversations as well as to display food in the event of a presentation. Traditional analog tools such as the whiteboard were not used intensively during the period of the study (Figure 14).

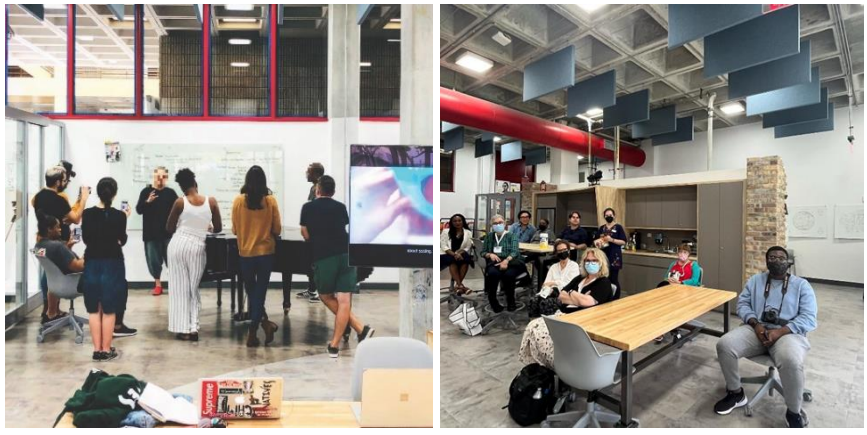


Figure 14: While the Preference for the Use of Open Kitchen Space Was Mixed, the Whiteboard Usage Was Absent within the Duration of the Study

Users expressed mixed feelings toward digital access in the physical incubator. There was a general perception that the digital infrastructure was unable to support heavy graphics and spontaneous transfer of digital information needed for collaboration and creativity. Some expressed the need to use other spaces on the campus that were more technology intensive in case they needed to do such type of work. However, there was also the feeling that in the current digital ecology, digital access was possible anywhere anytime.

Discussion and Implications

"Openness" as an Asset and Liability

The open office concept, an innovative model that emerged in the 1960s, was heralded by a new philosophy of work—a shift from worker "productivity" to a renewed focus on "creativity and collaboration." Open office spaces have traditionally been implemented to facilitate "serendipitous encounters." However, it has a mixed record of accomplishment in facilitating creative thinking. (Berger 1999; Bernstein and Waber 2019; Hirst and Schwabenland 2018).

While the overall image of the incubator was a positive one, the lack of correlation of fellow space with creative thinking seems to unearth a contradiction. The reason seems to be that the openness and "curation" of space was both, asset and liability. As an asset the openness afforded seamless interaction, variety of furniture configuration, generous space for presentations, access to unobstructed daylighting, and autonomy of walkability. But as a liability, the openness did not allow for smaller intimate spaces or ownership, created acoustical distraction, and was open to surveillance. The pristine sense of incubator also worked against the "messy" nature of creativity.

Such liabilities in the design of open plan offices are not new. It can be traced back to a past study that has been explicitly documented in the literature of creative workspaces. In the '90s Jay Chiat, the former boss of TBWA Chiat/Day advertising agency, in the hopes of transforming the work culture attempted to turn workers into wandering nomads Chiat wanted to inspire and creatively challenge his employees without assigned or permanent spaces. However, after a few years of its operation, the employees revolted against the disruption of ownership and routine, and the company dismantled the experiment. A recent study on the open office in the UK revealed how increased visibility and surveillance of the open office concept created gendered spatial power differences (Hirst and Schwabenland 2017). Some women spoke of the anxiety they felt and the restrictions they placed on themselves to avoid being judged by the "male gaze" with the newfound visibility being uncomfortable or oppressive. The managers of the open office saw it differently. According to them, the design would explicitly remove hierarchical and departmental boundaries and promote fluid, informal networking. Instead of oppressive surveillance, they saw an opportunity to grow into a fulfilling new identity as both an individual and a member of the collective.

Research conducted by Ethan Bernstein and Ben Waber of the Harvard Business School, who studied office workers transitioning from cubicles to open offices, found there was an increase in digital communication among workers and a dramatic drop in face-to-face interaction by as much as 70 percent. Bernstein theorized that moving to an open public affected the dominant social norms, prompting employees to avoid spontaneous conversations and switch to modes of communication that keep the workplace silent. Such behavior might have been exhibited in the activities of incubator spaces since acoustical privacy was considered one of the major disrupters of working in the incubator. However, to what degree it might have affected the co-working activity could not be measured in the scope of this study.

Assigned versus Threshold Spaces

The high correlation of creative thinking to mentor spaces as opposed to the fellow spaces brings into the function of assigned (programmatically intentional) and threshold spaces (transitional or accidental). Mentor offices that are programmatically restricted to more intimate interactions facilitate a one-on-one personal conversation. On the other hand, the phantom corridor adjacent to the fellow spaces is more open programmatically and might allow for informal and serendipitous encounters. These threshold areas seem to be important for mentor-fellow interaction as demonstrated in the high traffic in this area. While most focused work occurred in a seated position, we found it interesting that most mentor-fellow and mentor-mentor interactions happened in standing positions in this zone.

The need for more threshold spaces was also evident in the fellows wanting more intimate spaces. This could be a reason why the window space was seldom used. The scale of the windows and the distance from the major "footfall "areas did not necessitate or allow for any informal conversations to occur in a meaningful way. Christopher Alexander (1977) has pointed to the necessity of threshold spaces to move from one psychological state to another without an abrupt change. He calls it the "intimacy gradient," in which one finds spaces that provide increasing levels of intimacy and decreasing levels of publicness. Architect Herman Hertzberger (2005) conceives spatial structures that are in harmony with the movement of human bodies by creating gradients of usability and territorial differentiation (degree to which spaces are open or close to the users). In this sense, the kitchen area had the potential as a hangout space for brief conversations, but it seemed too exposed given its specific functionality of eating and trash.

Optimism and Inspiration

The positive image of the incubator was evident in terms of expressed adjectives such as a space of connection, welcoming, eclectic, free and creative, thought provoking, inspiring, and facilitating professional development. These moments of inspiration were documented in journals as integral components of the incubator experiences, reflecting the uplifting atmosphere. The transparency of the offices also allowed the mentors to demonstrate their

unique identity through personalization of display. The transactional nature of the mentor spaces allowed nonverbal communication between mentors and fellows to exchange information, allowing them to see the "human" side and unique personalities. Such optimism and inspiration are an important aspect of the ethos of incubators.

This point is highlighted by a report by the furniture manufacturer Steelcase Inc, which presents x dimensions of well-being in a creative environment, namely optimism, mindfulness, authenticity, belonging, meaning, and vitality. Optimism includes design for transparency so people can see and be seen and build trust, allow choice and control over where and how people work, and allow for personalization and individual customization. Of all the adjectives used to describe the incubator, optimism seems to be most evident as described in words such as welcoming, inspirational, and facilitating professional development. Nevertheless, authenticity seems to be the most desired in the incubator's functioning. Authenticity involves creating spaces that help people to feel comfortable expressing themselves, sharing their ideas, and incorporating informal non-contracting environments with a home-like feel. The user perception of "underwhelming" or "too pristine" to do "messy artistic" work seem to indicate a more desire for authenticity.

Balance between Collaborative and Solo Acts of Creativity

Finally, while the incubators are designed for collaboration and social exchange, solo work and places of solitude are as important. As demonstrated in the focus group findings, participants expressed that creativity had multiple dimensions and ways of expression, such as individual, collective, social communication, and artistic creativity. They expressed that some creative work requires social interaction, some creative work is done solo, while others involved in writing and researching require a quieter space. It is interesting that focused work activity was documented more than collaborative activity in the incubator, which goes on to show a balance need to be attained. Studies have shown that spaces that have this balance are likely to be more successful. Spatial organization includes components supporting focused activities, privacy, and autonomy, such as traffic and visual enclosure, multiple spaces to work, flexible and adaptable spaces, and a component assisting optimal functionality such as space size.

In summary, as shown in Figure 15, the incubator case study uncovers unique findings while acknowledging study limitations. Key themes include the "openness" paradox of open office concepts, which encourage interaction but lack privacy for creative thinking. The "assigned" versus "threshold Spaces" discussion highlights correlations between mentor spaces and creativity, contrasting with more open zones fostering impromptu interactions. Incubators are seen as optimistic and inspiring environments, allowing transparent mentor-fellow exchanges and aligning with dimensions of well-being. The balance between collaboration and solitude emerges as vital, acknowledging the importance of solo work and diverse creative processes. Striking a balance between focused and collaborative work shapes successful spatial layouts.

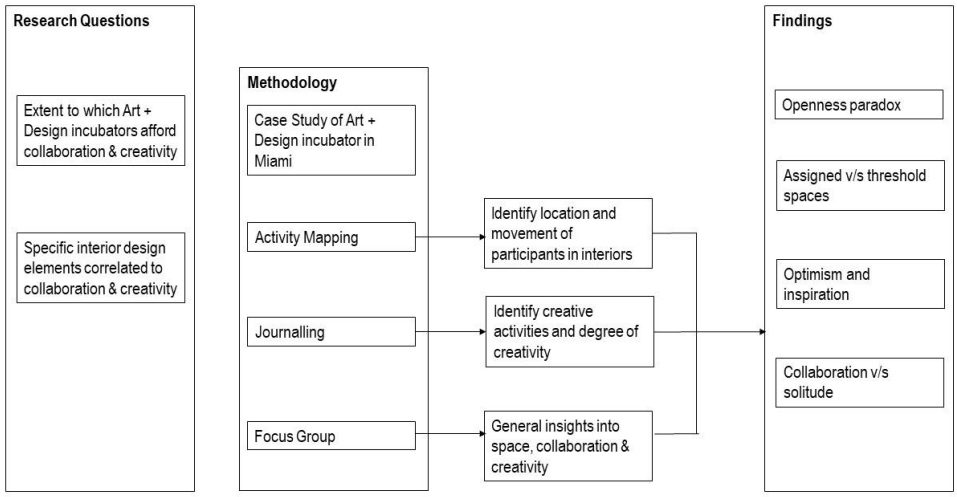


Figure 15: Research Design and Findings

Limitations

One limitation of this research is that it may not have fully captured all the transformative changes brought about by the lingering effects of the COVID-19 pandemic, especially concerning social distancing and the impact of remote work on collaboration and creativity. The study was also restricted in its ability to capture digital interactions between mentors and students, which could have had implications for the findings. Moreover, the data sample was limited, and participants' time in the incubator was constrained by their course and degree requirements. Additionally, the study's applicability was limited by the location and commute issues in a metropolitan city like Miami, and the use of cameras for activity mapping might have introduced bias among participants.

Although the sample size of eleven participants in a single-case study is small for making broad generalizations, the study's mixed-methods approach, with data triangulation from various methods, provides valuable insights. Despite the small participant sample, a significant amount of data was generated (approximately 200 hours of data in a six-week period), offering rich observations for inference, especially through video recordings of activity mapping. These observations were corroborated with journals and focus group techniques. The focus on a unique typology of an Arts + Design incubator, which is less common compared to other building types like retail, workplace, or residential buildings, presents an opportunity for further exploration in future studies.

Conclusion

In conclusion, the study on Arts + Design incubators highlights intriguing implications for the workplaces of the future. Design features play a crucial role in materializing the aspirational goals of organizational work culture. The demand for collaborative spaces from the creative class is likely to increase, particularly in rapidly changing remote work environments. Essential environmental-behavior concerns such as autonomy, privacy, adaptability, flexibility, acoustical comfort, and space accessibility should be considered. The emergence of the COVID-19 pandemic has prompted a reevaluation of intimate social interactions in the context of health and safety concerns. The rise of remote work has introduced various collaborative technological systems (e.g., Zoom, Microsoft Teams, Slack), raising questions about their impact on physical incubator spaces. Certain sectors, like finance and technology, are even questioning the necessity of physical spaces, given the potential benefits in terms of real estate and commute savings. This situation tests the role of human interaction in physical collaboration and creativity. In this dynamic context, further examination of the human dimensions of physical interaction and their impact on collaboration and creativity becomes essential.

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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ABOUT THE AUTHORS

Newton D'souza: Associate Professor, Department of Interior Architecture, School of Architecture, Florida International University, Miami, Florida, USA
Corresponding Author's Email:ndsouza@fiu.edu

Asha Kutty: Assistant Professor, Department of Interior Architecture, University of North Carolina, Greensboro, North Carolina, USA
Email: a_kutty@uncg.edu

Tania Torrado: Adjunct Professor, Department of Interior Architecture, School of Architecture, Florida International University, Miami, Florida, USA
Email: ttorrado@fiu.edu