Jun 17th, 12:00 AM

Design Studio Desk and Shared Place Attachments: A Study on Ownership, Personalization, and Agency.

Peter Scupelli  
*Carnegie Mellon University*

Bruce Hanington  
*Carnegie Mellon University*

Follow this and additional works at: [https://dl.designresearchsociety.org/drs-conference-papers](https://dl.designresearchsociety.org/drs-conference-papers)

**Citation**  
Design Studio Desk and Shared Place Attachments: A Study on Ownership, Personalization, and Agency.

Peter Scupelli* and Bruce Hanington
Carnegie Mellon University
* scupelli@cmu.edu
DOI: 10.21606/drs.2016.259

Abstract: Increasing numbers of students, limited space, and decreasing budgets nudge many university administrators to shift from assigned design studio desks to flexible workspace arrangements. This paper explores student attachment to the individual desk and shared spaces in a graduate design studio in the School of Design at Carnegie Mellon University. The studio had four interconnected spaces with: individual desks, collaborative workspaces, a kitchen-social cafe area, and a distance-learning classroom. We explored student perspectives and attitudes on studio aesthetics, functionality, agency, ownership, personalization, and occupancy patterns with four methods (i.e., online survey, student class schedules, interviews, time-lapse study). Perception of ownership, personalization, and agency were greatest for individual desks. Students perceived the individual desk as a primary territory even though the administration said desks were shared hot-desks. Individual work and collaborative work occurred throughout the studio regardless of functional assignment (e.g., spaces for individual work, collaboration, classroom).

Keywords: design studio; ownership; personalization; place attachment

1. Introduction

Universities are reimagining their design studios and transforming design studio education to integrate and influence global design practices. Design and architecture schools have shifted from solely individual projects to team projects (Koch, Schewennsen, Dutton, & Smith, 2002). Design educators and administrators are updating their design studios to facilitate geographically distributed collaborations, multidisciplinary teams, increased use of information technology, and flexible work environments.

For example, the d.school at Stanford University overhauled their spaces to support design studio courses, design workshops, and executive education (Doorley & Witthoft, 2012). The
Human-Computer Interaction Design program (HCId) at Indiana University created a new studio with a broad range of spaces, from limited individual desks for doctoral students to collaborative workspaces and project rooms for masters’ students (Callison, 2011; Gray, 2014). Faculty offices and students are collocated to increase interaction opportunities. The School of Design at Carnegie Mellon University redesigned their graduate design studios to support individual work, teamwork, social interaction, and distance learning (Scupelli & Hanington, 2014).

The implications of studio spaces and design education extend well beyond the academic setting. Increasingly, design and design thinking are receiving attention from business (Martin, 2009), software engineering (Meinel & Leifer 2011) and non-profits (e.g., Brown & Katz, 2009). Design thinking is an innovation method that relies on field research, prototyping, iteration, and refinement. Typically, students learn design thinking through design courses.

Studio education is generally characterized by five factors: co-location, learning-by-doing, continuous access, integrative learning, and mimicking practice (Lawson & Dorst, 2009). An ecological framework of studio-based education includes observable components, or “tools,” and pedagogical approaches used to construct design knowledge (Brandt, Cennamo, Douglas, Vernon, McGrath, & Reimer, 2011). The studio environment is designed to support a reflective, learning-through-doing pedagogy as students gain design knowledge and skills through project-based learning. Implicit in these descriptions of studio activity is the presence of students in the studio both during and outside of scheduled class time.

The design studio is therefore multidimensional; it is a physical place, a cultural place, and a social place. Studio education is similarly multidimensional, consisting of studio pedagogy, social dynamics, and ideals and expectations (Groat, & Ahrentzen, 1996). Yet studios are more than the functions supported, the research and design methodologies taught, and declared rules. Interactions in studio between students, faculty, staff, visitors, and administration shape social dynamics. People in a studio culture bring their ideals, values, and expectations. Furthermore, global student populations in studio environments require cultural sensitivity.

Human-centered research can inform design projects, but ultimately the user interprets how to use a designed artifact or environment. Users distinguish between functional needs and emotional needs. For example, in a pre-post occupancy survey of a graduate design studio, researchers found that the functional needs of students overwhelmingly were met, but pleasure-related and emotional needs linked to habitation for some were problematic (Scupelli & Hanington, 2014). Primary factors in the complex picture of studio habitation include perceptions of agency and stewardship within the occupied spaces.

In this paper, we discuss a human-centered research study exploring students’ perceived sense of ownership, personalization, and attachment within studio spaces. The focus of the study is a graduate design studio at the School of Design at Carnegie Mellon University. It has four interconnected spaces: individual workspaces, collaborative spaces, a kitchen and
Design Studio Desk and Shared Place Attachments

social cafe area, and a classroom with distance learning technology. We begin with a discussion of territoriality, place and possession attachment, and identity, followed by an overview of research methods, results, and a discussion of findings and design implications.

2. Territoriality

Human territories serve multiple needs ranging from physiological needs linked to survival, to higher needs such as status, recognition by others, achievement, or self-image (Gold, 1982 p.48). Furthermore, territories can also meet human psychological needs such as privacy, intimacy, and solitude (Altman, 1975). Three types of territories vary based on duration of occupancy, control, and psychological significance: primary, secondary, and public (Altman, 1975). Primary territories are occupied for long periods of time, such as homes, are controlled by their owners and have high psychological significance. Secondary territories are accessible to a broader range of people, with users and the community negotiating access rules, and have varying levels of psychological meaning. Public territories are available to all, such as a seat at a table in a library available on a “first come, first served” basis, and have less psychological significance.

In the design studio the individual desk is like a primary territory within a broader secondary territory—the studio environment. When students occupy their individual desks, there is an expectation of ownership, but the studio space itself where the desk is located is accessible to other occupants of the studio. Collaborative and social spaces could be considered secondary territories, where there is no expectation of exclusive ownership. However, secondary territories may have temporary ownership claimed; for example when a student saves a workspace for the day with personal effects. Unlike the university library where all university students have access, typically, a design studio is assigned to a cohort of students; it is not a public territory open to all students on campus.

Territoriality is expressed differently in primary, secondary, and public locations. Through personalization students express ownership of a primary territory. Personalization allows insight into aspects of a user’s identity. For example, personalization may reflect the need to establish individuality and communality within a culture (Gauvian, Altman, & Fahim, 1983), social status (Laumann & House, 1972), social group membership (Duncan, 1973), desirable images of occupants (Sadalla, Burrough, & Quaid, 1980), and rules (Wood & Beck, 1994).

3. Place and Possession Attachment

Place attachment describes the emotional connection between people and place (Low & Altman, 1992). The Tripartite Model defines the variables of place attachment as the three P’s: Person, Process, and Place (Scannell & Gifford, 2010). The Person dimension describes individual and collective meaning. People feel stronger attachments to places they identify with or feel proud to be a part of. The Process dimension describes affective, cognitive, and behavioral aspects of the bond people have with place. The Place dimension describes
attachment through characteristics of the place itself, including social and physical elements (Hidalgo & Hernández, 2001).

Material possession attachment describes the relationship between a specific person and object of possession. People are able to explain the extent of “me-ness” or “not me-ness” associated with their possessions (Kleine, Kleine, & Allen, 1995). This association of “me-ness” can be extended to environments, and to intangibles such as policies that inform behaviors. For example, administrators can impose rules and policy but the occupants need to enact such ideas. In the graduate design studio, researchers found that students ignored a “hot-desk policy” and each claimed individual workspaces. Similarly, students ignored a rotation system for studio maintenance imposed by faculty administration, instead forming their own self-organizing procedures (Scupelli & Hanington, 2014).

Place attachment and possession attachment illustrate similar descriptions of attachment (Kleine, Schultz, & Baker, 2004). Attachment is a type of self-extension; it requires personal history between self and place; it varies in strength; it is multifaceted (cognitive, emotive, and behavioral), emotionally complex, and dynamic. Place and possession attachment serve similar basic functions in identity definition (autonomous and affiliated selves), and self-continuity/change (e.g., self-adaptation to new places).

4. Identity Construction

Individual identity and sense of self is linked to possessions through conscious and unconscious social processes (Goffman, 1959; Belk, 1988). Consumer identity is often defined through product ownership and use (Belk, 1988). Personal identity “sans possessions” is based on two perspectives: the self-narrative view and the trait-centered view. Within the “sans possessions” self-narrative view the self is seen as a multi-faceted, multi-layered, social and psychological being that continually reflects deeply on itself (Mittal, 2006). In the trait-centered view, the self is the sum of enduring personal qualities, such as personality traits, superficial behavior, and body appearance traits (e.g., Sirgy, 1982; Morgan, 1993; Baumgartner, 2002). Examples include personal descriptors such as “introverted”, “outgoing”, “intellectual”, “maker”, etc.

The consumers’ identity resides in a personal narrative about who a person is and strives to become (e.g., McAdams, 1996; Murray, 2002). A consumer’s self-identity is called the “I” and includes virtually everything one has owned or lived with. Some products and services relate to the extended self because they play instrumental roles in achieving success and competence or reassert personal values and beliefs that in turn are linked to the concept of “I.” Possessions that become part of the “I” are only those that the consumer views as defining his or her “I”’. There is a tension between “I” and “me.” Whereas “I” is how a person sees himself or herself, “me” is how one believes others perceive him or her (Mittal, 2006).

There are three approaches to resolve tensions between “I” and “me”: modifying reference groups, educating others, and modifying consumption (Mittal, 2006). For example, students might decide to increase or decrease their presence in the studio environment and adjust
how they engage with others. Unlike workplaces (or classes) where attendance is required at certain times of day, students can choose to work where they prefer. The presence or absence of students in the studio outside of classes is therefore a telling behavioral trace and indicator of work (and possibly affiliation) preferences. Students may also modify consumption of products; for instance, exhibiting more “designerly” possessions such as art postcards, design books, sketchbooks, and design tools on their desk, or dressing in stereotypical designer clothes.

5. Research Methods: Ownership, Personalization, and Attachment

We conducted a study of student occupants in a university graduate design studio suite comprised of four interconnected spaces: an individual workspace, collaborative space, a kitchen-social space, and classroom (Figure 1). To investigate student use of the graduate studio and sense of ownership, personalization, and place attachment, we employed an online survey, interviews, schedule analysis, and time-lapse video studies.

The online survey had 11 questions with 23 sub-questions with Likert scale responses, and nine open-ended comment boxes. The survey questions below were asked of studio suite occupants once in fall semester 2013.
• **Core times in studio** questions asked participants when (day and time) and why students went to the graduate studio.

• **Perceived ownership** questions asked about sense of ownership on a four-point scale: absolute ownership, some ownership, very little ownership, absolutely no ownership.

• **Personalization** questions asked whether or not and how students personalized studio spaces.

• **Feelings** questions were about what makes students feel at home, or uncomfortable.

• **Likes/desires** probed for preferences about the graduate design studio.

• **Importance of factors and policies** were queried on seven dimensions: aesthetics (e.g., look and feel, atmosphere), furniture (e.g., function, quality), acoustics (e.g., noise level), upkeep (e.g., maintenance, cleaning, order), agency (e.g., ability to implement change), sense of ownership (e.g., it’s mine to use), and personalization (e.g., I can adapt it to my needs). For each dimension, respondents answered on a Likert scale how important each factor was for individual workspace, collaborative spaces, social spaces, and classroom (extremely important, important, neutral, not very important, not at all important).

• **Match of factors and policies with personal tastes** questions are indirect measures of attachment to place and processes. Students were surveyed on the same seven dimensions as above, again on a Likert scale, rating for each space how well the factors and policies matched their personal tastes (i.e., totally me, somewhat me, neutral, not really me, totally not me).

Survey data was analyzed using t-test comparisons between the responses for different studio locations (i.e., individual workspace, collaborative spaces, social spaces, and classroom). Open-ended question responses were unitized and then coded for content.

**Interviews** were conducted as “touchstone tours” at student desks, with conversational explanations of possessions, material organization and personalization documented with notes and photographs.

**Class schedule data** for the 37 students enrolled was tabulated by time of day and day of week. Student schedule classes were coded to estimate when students were in class inside the studio classroom and elsewhere on campus.

**Time-lapse videos** provided workspace occupancy data. Pictures were taken every minute with five cameras placed throughout the studio suite to capture where people work in each area. Workstations, tables, and seating were mapped and numbered, and the number of people present at each location in each frame counted.
Results
The results are presented in the following sections: time-lapse study, student schedule analysis, and six survey topics supplemented with interview data: (a) core times in studio, (b) perceived ownership, (c) personalization, (d) aesthetics, (e) upkeep, maintenance, cleaning, and order; and (f) agency.

Timelapse study
A time-lapse video of the graduate design studio was filmed for one week and coded to count the number of people working at each location (e.g., desk, chair). In the time-lapse observations, on average the design studio was occupied 67% percent of the time (52% on weekdays, and 15% on weekends) on average 12% of the 37 students were in studio on weekdays and 5% on weekends. Overall, peak occupancy was 26 students (70.27% occupancy). Weekday morning occupancy (7am-11:29 am) ranged from 0 min to 20 max with an average of almost 7 students (19% occupancy). Weekday lunchtime occupancy (11:30am-1:29pm) ranged from 1 min to 26 max with an average of 15 students (40.6% occupancy). Weekday afternoon occupancy (1:30pm-4:29pm) ranged from 1 min to 25 with an average of 13 students (36% occupancy). Weekday evening occupancy (4:30pm-6:29pm) ranged from 1 min to 13 with an average of students 5 (15% occupancy). Weekday late-night occupancy (6:30pm-6:59am) ranged from 0 min to 8 with an average of 2 students (6% occupancy). Table 1 shows the average student occupancy calculated for weekdays and weekends according to the different times of day. Interestingly the regular morning time is ten times less popular on the weekend, lunchtime more than three times less popular, the afternoon by a factor of two and the late night times differ by five percent.

Table 1. Student occupancy in design studio on weekdays and weekend based on time-lapse study April 1-8, 2014. Percentages calculated dividing number of people counted in timelapse footage divided by 37 enrolled graduate students.

<table>
<thead>
<tr>
<th></th>
<th>Morning</th>
<th>Lunch</th>
<th>Afternoon</th>
<th>Evening</th>
<th>Late Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>20.60%</td>
<td>39.67%</td>
<td>35.38%</td>
<td>14.44%</td>
<td>5.56%</td>
</tr>
<tr>
<td>Weekend</td>
<td>2.05%</td>
<td>12.78%</td>
<td>15.24%</td>
<td>8.38%</td>
<td>1.80%</td>
</tr>
</tbody>
</table>

The graduate design studio has individual workspaces, collaborative space, social spaces, and a classroom. Interestingly, approximately half of the students worked at individual workstations and the others worked elsewhere in the studio (Figure 2). Where the thirty-seven students choose to work in the studio varies according to the time of day. The individual workspace seems to be by far the most popular place to work compared to the collaboration spaces, social spaces, and the classroom use outside of scheduled classes. Figure 2 has four pictures to show the four locations studied in the studio.
Figure 2. Location where students worked in the graduate studio based on timelapse information (April 1-8, 2014). Students tended to spread out throughout the studio. Student occupancy in the individual workspaces, collaborative spaces, and social spaces in the design studio on weekdays for 37 students based on time-lapse study April 1-8, 2014.

Figure 2. Images of the four studio spaces studied from left to right: individual desk area, collaborations spaces, kitchen social spaces, and view into the classroom.

Student schedule analysis
Table 2 shows student occupancy percentages in design studio based on timelapse and student schedules. When students attend class, they usually are in the classroom rather than the studio spaces. Percentages are calculated by dividing number of students counted in timelapse by 37 enrolled students minus number of students in class at that time of day. For example, Monday morning 17 students were in class, meaning that only 20 students could potentially work in the studio. According to the timelapse data, on average 4.92 people were in studio on Monday mornings (4.92/20 = 0.2461 -> 24.61%). Example Figure 3 below shows the average hours that students were scheduled to attend classes for the thirty-seven enrolled first and second year students, and the average amount of time spent working at an individual desk was calculated base on a one week time-lapse data (April 1-8, 2014).

1 Please note that in Table 1, in the previous page, we estimated occupancy by dividing number of people counted in timelapse by 37 students which is the total number of students enrolled in the graduate programs. So occupancy in studio on Monday mornings calculated that way would be (4.92/37=0.1329 ->13.29%).
Table 2. Student weekday occupancy on weekdays based on time-lapse study April 1-8, 2014 and student schedule. Percentages for day of week and time of day calculated by dividing number of people counted in timelapse footage divided by students not in class.

<table>
<thead>
<tr>
<th></th>
<th>Morning</th>
<th>Lunch</th>
<th>Afternoon</th>
<th>Evening</th>
<th>Late Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>4.92/20</td>
<td>15.7/37</td>
<td>15.8/19</td>
<td>4.90/24</td>
<td>0.84/37</td>
</tr>
<tr>
<td></td>
<td>24.61%</td>
<td>42.60%</td>
<td>83.30%</td>
<td>20.45%</td>
<td>2.29%</td>
</tr>
<tr>
<td></td>
<td>38.95%</td>
<td>67.57%</td>
<td>45.40%</td>
<td>15.63%</td>
<td>3.98%</td>
</tr>
<tr>
<td>Wednesday</td>
<td>9.84/20</td>
<td>21.0/37</td>
<td>16.6/20</td>
<td>6.04/24</td>
<td>1.57/33</td>
</tr>
<tr>
<td></td>
<td>49.24%</td>
<td>57.00%</td>
<td>83.33%</td>
<td>25.17%</td>
<td>4.76%</td>
</tr>
<tr>
<td>Thursday</td>
<td>8.72/17</td>
<td>13.6/23</td>
<td>10.9/31</td>
<td>5.73/37</td>
<td>0.95/37</td>
</tr>
<tr>
<td></td>
<td>51.29%</td>
<td>59.50%</td>
<td>35.16%</td>
<td>15.50%</td>
<td>2.57%</td>
</tr>
<tr>
<td>Friday</td>
<td>4.79/29</td>
<td>9.04/37</td>
<td>9.35/36</td>
<td>5.00/35</td>
<td>0.87/36</td>
</tr>
<tr>
<td></td>
<td>16.52%</td>
<td>24.44%</td>
<td>25.97%</td>
<td>14.31%</td>
<td>2.43%</td>
</tr>
</tbody>
</table>

Figure 3. Average amount of hours spent in classes according to student schedule for first and second year students and average amount of hours spent at individual desk for first and second year graduate students. The class schedules is based on 37 enrolled graduate students and the occupancy of individual workspaces is based on one week of time-lapse data (April 1-8, 2014).

Online Survey
Twenty-four students responded to the online survey; approximately half were first year graduate students.

Core times in studio Among the many reasons to go to studio, students answered: attend classes (91.67%), individual work (83.33%), team meetings (70.83%), and socialize (33.33%).
Core times students go to studio were in the morning, during lunchtime, and in the afternoon during weekdays (Figure 4). In the survey responses, students overestimated time in graduate studio compared to occupancy estimates based on time-lapse footage both for weekdays and weekends.

![Figure 4. Percent of survey result of when students say they go to graduate studio (n=24) plotted next to time-lapse data of when students were seen in the graduate studio (April 1-8, 2014).](image)

**Ownership** Students were asked how much ownership they felt over the following spaces in the graduate studio suite: desk, collaborative space, social / kitchen area, classroom. The Likert scale was measured on a four-point scale (4=absolute ownership, 3=some ownership, 2=very little ownership, 1=absolutely no ownership). Quite predictably students expressed most ownership for their desk.

Six paired-samples t-test were conducted to compare ownership of desk, collaboration spaces, kitchen social space, and classroom. Ownership of individual desk (M= 3.83, SD=.39 ) was significantly greater than: ownership of collaboration spaces (M= 2.57, SD=.66) t(22)= 8.04, p< .0005; ownership of kitchen social spaces (M= 2.35, SD=.65) t(22)= 9.71, p< .0005; and ownership of classroom (M= 1.87, SD=.81) t(22)= 12.22, p< .0005. These results suggest that ownership of desk is greater than all other spaces in the graduate studio.

Ownership of collaboration spaces (M= 2.57, SD=.66) differed significantly from ownership of kitchen social spaces (M= 2.35, SD=.65) t(23)= 2.46, p< .001; and ownership of classroom (M= 1.87, SD=.81) t(22)= 3.76, p< .001. Ownership of kitchen social spaces was significantly greater than ownership of classroom t(23)=2.70, p<.013. We interpret these to mean that sense of ownership decreases as sharing increases (Figure 5).
Respondents rated importance of ownership of the desk (M=4.44, SD=.62) significantly more important than the: collaborative spaces (M=3.44, SD=.70) t(17)=5.53, p<.0005, kitchen social space (M=3.38, SD=.70) t(17)=4.89, p<.0005, and the classroom (M=2.82, SD=.53) t(16)=8.24, p<.0005. In short, ownership of one’s desk was more important than collaborative spaces, kitchen social spaces, and the classroom.

Figure 5. Perceived ownership of studio spaces based on survey responses (n=24). Perceived ownership reported on a four point scale (absolute, some, very little, none).

Not all shared spaces are equal. Importance of ownership of the collaborative spaces and kitchen social spaces were statistically similar, but the classroom was less important than: kitchen social space t(15)=3.48, p<.003 and the collaborative spaces t(16)=3.43, p<.003.

The average sense of ownership (e.g., it is mine to use) matched the personal tastes and behaviors of respondents differently depending on the space. Ownership with the desk matched personal tastes (M= 4.28, SD=.67) significantly more than: collaborative spaces (M=3.67, SD=.59) t(17)=3.34, p<.004, social kitchen areas (M=3.5, SD=.62) t(17)=3.76, p<.002, and the classroom (M=3.4, SD=.51) t(14)=3.60, p<.003.

Figure 6 shows the three ownership questions side by side and significant differences between locations for each question (individual desk, collaboration spaces, social spaces, classroom). All results are reported on a five-point scale.
Personalization

Personalizing one’s desk was more important than other shared spaces. Respondents rated importance of personalization for the desk (M=4.24, SD=.90) significantly more important than collaborative spaces (M=3.53, SD=.72; t(16)=4.24, p<.001), social kitchen areas (M=3.13, SD=.81; t(15)=5.00, p<.0005), and the classroom (M=3.06, SD=.93; t(15)=4.87, p<.0005). Personalization of collaborative space is significantly more important than the kitchen social space t(15)=2.24, p<.04 and the classroom (15)=2.18, p<.05. However, personalizing the social kitchen areas is of similar importance as personalizing the classroom.

The match the personal tastes of personalization (e.g., I can adapt it to my needs) differed by space. We found two trends in personalization of the desk-workspace to match personal tastes (M=3.89, SD=.76) more than: collaborative spaces (M=3.56, SD=.62) t(17)=1.84, p<.08, and social kitchen areas (M=3.47, SD=.61) [t(18)=1.91, p<.07]. Average personalization matched personal tastes and behaviors significantly more when compared to the classroom (M=3.29, SD=.59) t(16)=3.39, p<.004; (Figure 7).

In an open-ended survey question 79% of participants said they personalized the graduate design studio space (figure 8). First, the open-ended comments were unitized into 55 single ideas. Second, we coded them as 48 positive and 7 negative. Of the personalization coded as positive, 87.3%, was overwhelmingly about one’s desk and workspace (91.67 % of all comments), 4.17% were about personalizing collaborative resources such as whiteboards for projects, 2.08% were about personalizing the kitchen, and 2.08% about personalizing unspecified parts of the studio space. Personalization coded as negative, 7.27%, was about individual desks. Personalization coded as other was 5.33%.
Figure 7. Survey participants rated personalization for the four spaces according to importance and personal preference match (n=24).

Figure 8 illustrates the range of personalization observed in the desks. Some students displayed design related artifacts (e.g., cutting mats, sketchbooks, designer books), others more personal items, others used the desk to store materials, and others limited items on the desk.

Figure 8. Four examples of desk personalization ranging from more or less personalized.

**Aesthetics** Overall, aesthetics were important to respondents independent of location. Importance of the desk aesthetics (M= 4.32, SD=.82) was significantly greater than the collaborative space (M= 4.05, SD= .17 t(18)=2.04, p<.05), kitchen social space (MD=3.95, SD=.85 t(18)=2.35, p<.03), and classroom (MD=3.94, SD=.87 t(17)=2.15, p<.05). Importance of collaborative spaces were not significantly different from kitchen social spaces (t(19)=.81, p=.43) and the classroom (t(17)=1.46, p=.16) and aesthetics of the classroom did not differ significantly from aesthetics of the kitchen (t(17)=1.46, p=.16).

We found no significant differences in studio aesthetics matching respondents’ tastes and behaviors: aesthetics of the desk workspace (M=3.63, SD=1.45), collaboration space...
Upkeep, Maintenance, Cleaning, and Order

Importance of upkeep (e.g., maintenance, cleaning, order) around the desk (M=4.16, SD=.90) was similar to collaborative spaces (M=4.21, SD=.85), and classroom (M=4.11, SD=.88), but significantly less important than the kitchen social space (M=4.47, SD=.84) t(18)=-2.05, p<.055.

We measured personal tastes and behavior match for upkeep, maintenance, cleaning and order of the studio. The personal tastes for upkeep averages for desk (M=4.29, SD=.61), was greater from upkeep of the kitchen social space (M=3.64, SD=1.08), t(13)=2.22, p<.05, and upkeep of the classroom (M=3.50, SD=.51), t(17)=4.12, p<.001. Upkeep of the collaborative spaces (M=4.21, SD=.58), was significantly different from the upkeep of the classroom t(17)=3.80, p<.002 (Figure 10).

Agency

Respondents rated importance of agency (e.g., ability to implement change) for the desk (M=4.31, SD=.89) as significantly greater than: collaborative spaces (M=3.79, SD=.92) t(18)=2.73, p<.01, social kitchen areas (M=3.58, SD=1.21) t(18)=2.80, p<01, and classroom (M=3.24, SD=.90) t(16)=4.52, p<.0005. In other words, respondents valued agency over their desks more than agency shared spaces. Importance of agency over the collaborative spaces and social kitchen areas is similar but significantly more so than the classroom t(16)=2.31, p<.03.
Respondents average agency (e.g., ability to implement change) match to personal tastes and behaviors differed by space. Agency with the desk matched personal tastes (M= 4.2, SD=.77) significantly more than agency preferences in the: collaborative spaces (M=3.53, SD=1.06) t(14)=2.47, p<.03, social kitchen areas (M=3.27, SD=1.01) t(13)=2.22, p<.05, and the classroom (M=3.23, SD=.46) t(14)=5.53, p<.0005. There were no significant differences in personal tastes and behaviors for agency (e.g., ability to implement change) in the shared spaces (i.e., collaborative spaces, kitchen-social spaces, classroom). Students claimed an individual desk whereas in the shared spaces they shared furniture and the space. Agency to implement changes in the kitchen-social spaces was significantly greater than the agency to implement changes in the classroom t(13)=2.11, p<.05 (Figure 11).

Discussion
The timelapse study, survey questions on time, and student schedule analysis together provide a complex picture of student uses of the graduate studio. Unsurprisingly, students preferred working in studio on weekdays (Table 1). The occupancy rates of the studio linked to class schedules show high occupancy rates for students (Table 2).

First year graduate students spent close to twice the time in scheduled classes and half the time at their individual desks compared to second year students (Figure 2). The differences are likely explained by the second year students’ thesis project, which accounts for half of required course credits but occurs primarily within the studio yet outside of the classroom. Another factor is that the unspoken seniority of second year students generally resulted in
the self-selection of more desirable desk locations, which may have led to increased time spent choosing to work there.

Students claimed individual desks at the beginning of the year, overriding the stated “hot-desk” policy. Some occupied a desk each year and others the same desk for both years. Second year students picked desks with more desktop privacy, closer to windows, and facing the door (Scupelli, 2016). First year students, with less desirable individual desks, worked elsewhere in the studio (e.g., collaborative areas, social areas, classroom). A competing explanation is that students prefer working in less crowded areas.

The greater time reported in studio in survey questions are likely explained by students adding up class-time and work-time in the studio, reflecting that they counted time in class as time in the studio suite, whereas class-time was not captured in the time-lapse study. It is also possible that students naturally perceive that they spend more time in the studio than they actually do.

The desk was perceived as a primary territory and the shared spaces as secondary territory. There were three tiers of perceived ownership in the studio: (a) personal desk workspace, (b) collaboration, kitchen-social spaces, and (c) the classroom.

The collaboration spaces, kitchen-social spaces, and classroom were shared on a need to use basis; the social and kitchen spaces were to be used by graduate students and their guests. The sense of ownership, importance of ownership, and level of “me-ness” of the desk is significantly greater than the rest of the studio spaces.
The key differentiator for sense of “me-ness” was the ability to claim exclusiveness of the individual desk when compared to the shared spaces. The collaboration, kitchen-social spaces, and the classroom can be used for individual work and teamwork, but given the lack of exclusive claims, they are secondary territories.

Personalization varies by location. Personalizing one’s desk is more important than personalizing collaborative spaces, which in turn are more important than the kitchen-social areas and the classroom. Personalization was stronger in primary territories as was importance of ownership.

Respondents’ match of personal tastes and behaviors for personalization in the kitchen-social space was significantly different from the classroom. The kitchen-social space was much more active and students expressed more agency than for the classroom, where faculty and administration ensure a lack of student personalization (e.g., rules to clean whiteboards). The degree of personalization of a desk compared to the shared spaces in studio seems to overlap with “place attachment” linked to personal preferences, social processes, and place characteristics.

The entire studio has a common color palette and similar furniture, but personalization increased ratings of the importance of studio aesthetics. We speculate that personalization of the desk and perceived ownership contributed to the rating of aesthetics of respondents’ desks as significantly more important than the aesthetics of the rest of the studio spaces.

The importance of aesthetics for collaborative spaces, social spaces, and the classroom were similar, with average ratings between neutral and somewhat “me”. The aesthetic matches to participants’ own style for all studio spaces were similar.

For all studio spaces students rated “upkeep, maintenance, cleaning and order” as between important and extremely important. Upkeep of the kitchen social space was more important than the individual desks. But importance of desk upkeep was similar to collaborative spaces and classroom. One explanation is that kitchen spaces contain individual messes that affect others (e.g., dishes in the sink) and messy desks mostly affect the owners. Greater tensions were witnessed in the open-ended comments around upkeep of the social kitchen areas.

Students rated importance of agency and the match of agency to personal tastes highest for desks, second highest for collaborative spaces and social kitchen areas, and of least importance in the classroom. A possible explanation is that agency over a personalized desk better matches personal tastes and desires than shared agency in shared spaces. The desk is a primary territory even though it is in a shared room. Students felt agency over the desk, but lacked agency over social norms such as noise levels in the individual desk areas. The shared spaces are secondary territories available to others. The tensions witnessed in the kitchen are due to secondary territory violations.

The respondents expressed greater agency to implement changes in the kitchen-social space than in the classroom. Graduate design students share the kitchen-social space; they clean and enforce social norms. In the classroom, access is granted to enrolled students, and
faculty and school administrators enforce social norms. Agency decreases as the number of people sharing the space and stakeholder roles enforcing social norms increase.

**Design Implications**

Building studio culture, fostering collaboration, and ensuring accessibility of students and faculty requires encouraging student occupancy of the studio outside of classroom hours. To achieve this, studio design would ideally equate the desirability of all desk choices, or impose a desk occupancy rotation system. Hot desk or time-shared arrangements are challenging to enforce, and would need to be balanced with affordances for personalization such as storage and display of personal effects, implying enough ownership of the space that it be deemed a primary territory by the occupants. Similarly, collaborative spaces could provide an element of personalization through mobile or layered whiteboards, or digital whiteboards, to allow for individual and team process work to remain intact and visible. It is interesting to note that personalized spaces are rated as more aesthetically pleasing.

The provision of both secondary and primary territories is usually necessary and typically advantageous, with design opportunities to encourage desirable attitudes and behaviors. Given that primary territories foster a succession of personalization, me-ness, agency and ownership, desirable attitudes and behaviors may extend into secondary territories. For example, the benefits of designing the studio with contiguous space “zoned” for differing uses has benefits in terms of encouraging maintenance and upkeep over the entire suite, including secondary territories. Furthermore, visitors frequent shared spaces, particularly the social space. This element of self-presentation has a social consequence if upkeep of the space is poor.

Setting expectations through a shared understanding of policies is critical for design success. For example, to ease tensions in the kitchen and social space, it is important to orient each incoming cohort, in consultation with continuing students, to protocols for upkeep and maintenance. This should explicitly address cultural factors, so that for example, new occupants know that in an American context, tasks are equally distributed without division by age, gender, or background. Likewise, to set expectations in secondary territories such as classrooms, one tactic is to impose administrative oversight to intentionally discourage agency. However, another tactic would be to arrive at a shared set of policies through conversation between faculty and students, collaboratively deciding on rules and how they will be enforced.

**Summary**

In this paper we explored student perspectives and attitudes on studio aesthetics, functionality, agency, ownership, personalization, and occupancy patterns through four data sources: an online survey, interviews, schedule analysis, and a one-week time-lapse study. Students worked individually and collaboratively everywhere in the studio regardless of the functional assignments of each space. We believe students’ preferences focused on best
available seat in the studio environment as a whole. The student occupancy rates adjusted for class schedules were much higher than base rate occupancy calculations.

First year graduate students spent more time in scheduled classes than second year students and half the time at their individual desks. Future work should explore how class schedules, desirability of desk, and other factors contribute to studio occupancy choices.

Students perceived the individual desk as a primary territory even though the administration tried to position the workspace as a shared hot-desking space. Students rated importance of ownership, personalization, agency, and aesthetics greater for the individual desk compared to the rest of the studio spaces. The trend of desks being more "me" than collaborative spaces and kitchen-social space, and significantly more "me" than the classroom can be interpreted to mean that personalization of the desk is associated with a greater "me-ness" than in shared spaces. In short, perceived me-ness of a space decreases as sharing of spaces with other people increases. Sense of “me-ness” is also aligned with sense of agency. The “me-ness” of Aesthetics was similar across all studio spaces.

Importance of upkeep was most important in the kitchen-social spaces and shared spaces compared to the individual desk. In individual desk messes are harmless, whereas it is important that messes in shared spaces be cleaned up. “Me-ness” decreases in social spaces and classroom where administration and faculty impose the importance of maintaining order.

The survey results reported in this paper focus on desk and shared spaces as “possession.” Our future work will explore “place attachment” in more detail. Five areas to explore include: (a) affect, cognition, and practice of attachments; (b) different places that vary in scale, specificity, and tangibility (e.g., my desk, our kitchen, our studio); (c) different actors and stakeholders involved in the studio (e.g., individuals, groups, cultures); (d) different social relationships; and (e) temporal aspects (Low, & Altman, 1992).

Acknowledgements

We would like to thank the Berkman Faculty Development Fund at Carnegie Mellon University for partially supporting this research; Andrea Fineman, Xiaowei Jiang, Yin Wang for their assistance with field observations, data collection, and time-lapse coding.

References


Low, S. M., & Altman, I. (1992) Place attachment (pp. 1-12). Springer US.


Meinel & Leifer (2011) software enginnering design thinking?


---

**About the Authors:**

**Peter Scupelli** is Assistant Professor, Chair of the Environments Track, and Director of the Learning Environments Lab in the School of Design at Carnegie Mellon University. He holds a PhD in HCI; MDes in interaction design, and an architecture degree.

**Bruce Hanington** is Associate Professor and Director of Graduate Studies in the School of Design at Carnegie Mellon University. He is co-author of *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. 

---
