Enhanced on-campus coffee shop interiors: Informal learning and design for the millennial students

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Enhanced on-campus coffee shop interiors: Informal learning and design for the millennial students

by

Yi Yuan

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF FINE ARTS

Major: Interior Design

Program of Study Committee:
Fred Malven, Co-major Professor
Lee Cagley, Co-major Professor
Paul Shao

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2019

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DEDICATION

First, I would like to thank my family. I would like to thank my husband who provided tremendous support during the course of my studies. I would also like to thank my mom and dad who have supported me both financially and mentally. I would never have achieved what I have without their guidance and support.

Second, I would like to thank Fred Malven, my major professor, for being an incredible advisor and mentor. He has been patient and inspirational through my course of study and brought a lot of amazing, yet practical, inspirations. In addition, I would like to thank my committee members, Lee Cagley and Paul Shao, for their incredible support.

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This study is an exploration into the relationship between on-campus coffee shop and Generation Y students informal learning behavior, in an attempt to better understand how an on-campus coffee shop enables students to better engage in informal learning activities. To explore this concept in depth, a quantitative investigation approach has been implemented to integrate the following aspects regarding informal learning café developments: zoning, environmental variables, food and drinks, power outlets, view nature, furniture comfort, workplace adjustments, seating options, study tools, storage space, and overall design.

This study consisted of three segments. The first segment is a literature review, a link is established that an on-campus coffee shop promotes social activities, which coincide with one of the most pronounced characteristics of Generation Y (social activity). Additionally, informal learning happens when social activities are engaged. The link among these three aspects lead to the conclusion that cafés are the best places for informal learning to take place. The second segment is observation using a survey to obtain information on users’ behavior, trends, issues, and demands when they are engaging in informal learning activities from two existing on-campus coffee shops. To holistically combine and balance all the findings to create an on-campus coffee shop that could best support Generation Y students informal learning activities. Future exploration of interior design implications to enhance an on-campus coffee shop and informal learning activities are discussed and clarify how the results of this study can be used in specific applications.
CHAPTER 1. INTRODUCTION

Statement of the Problem

“Today’s student – whether 18, 22, or 55 – have attitudes, expectations and constraints that differ from those of students even 10 years ago. Learning spaces often reflect the people and learning approach of the times, so spaces designed in 1956 are not likely to fit perfectly with students in 2006”

--- Spaces as Change Agent (Olinger, 2006)

With the rapid development of technology, students' lives on campus are undergoing tremendous change. Former learning behaviors may no longer be suited for today’s learning environment. Generation Y is the main population in school and their ideas of learning and learning behaviors have also changed as the time progresses (Oblinger, 2003). It is this change that changes the demands for the learning spaces from students.

Learning is the initial activity on campus. As Olinger said, now students are different from the students 10 years ago, and pay more attention to social activities and having fun while learning (Olinger, 2006). “Students will be in control not only of when they learn, but will demand that they contribute to their learning through discussions and collaboration, creating content while doing so”(Morrison, 2016, p. 5). All of the changes lead to a new type of learning behavior, called informal learning.

Informal learning has already been defined in the literature, most commonly as unofficial and unscheduled and informal learning can happen anytime and anywhere outside the classrooms (Neal & Hainlen, 2012). A survey reported by the American Society of Training and Development found that 56% of organizations tended to create more opportunities for informal learning (American Society for Training and Development, 2008).
(Oblinger, 2003)) also indicated that a majority of students work more than 30 hours outside the classrooms. Because of the high demand for informal learning space from students, universities are creating more and more spaces outside the classroom (O’Neill, 2013). Therefore, informal learning has become an important source of learning in universities and workplaces.

Because of the increasing popularity of informal learning, anywhere on campus can be transformed into an informal learning space, such as pathways and gathering spots. They provide a place where they can exchange their ideas (Acker & Miller, 2005). Based on the increase demand for informal learning space, designers are continuing to improve it. Lomas and Olinger state that today’s informal space is usually combine with food services and wireless access, where students can do their casual activities, such as searching the Internet, catching up on e-mail, or chatting with friends (Lomas & Oblinger, 2006).

With the help of student surveys and focus groups at Stanford University, (Holeton, 2000) lists the requirements of a space where informal learning can happen flexibility, comfortable, ergonomic seating, food and drink, and pervasive technology. These factors are also the characteristics of “third place,” such as Starbucks. Third place is “public places on neutral ground where people can gather and interact (Ramon Oldenburg & Brissett, 1982, p. 271)”. It is inexpensive, providing food and drink and easy accessible (Ray Oldenburg, 1989). In an informal learning space or third place, food and drinks are one of the main hallmarks and the most common third place observed is the coffee shop or cafeteria.

The coffee shop or cafeteria on campus is different from those outside campus because of the target group is students. Their central activities on campus are learning (Olinger, 2006). Therefore, the functionality of the on-campus coffee shop should coincide
with demands from students. The central idea of this study is to combine the on-campus coffee shop and informal learning space together to create an ideal study space in order to accommodate the demands of today’s learning environment.

**Purpose of the Study**

Why is informal learning space paid abundant attention by the university? As Olinger mentioned, the attitudes, expectations, and behaviors for today’s students are different from students 10 years ago (Olinger, 2006). Because of the rapid development of technologies, “more learning is taking place outside of class time than ever before” (M. B. Brown & Lippincott, 2003). “Up to 90% of learning happens outside the classroom” (Steelcase Education, 2015b, p. 41). Wilson and Randall point out that universities must be more innovative and creative in the ways they support the demands for future students (G. Wilson & Randall, 2010).

More literature, such as *Informal Learning Space – Make Better Use of Your Space*, indicates that students’ learning is affected by their physical environment. Every student has different criteria about an ideal learning environment. Informal learning space can provide a space to meet the different students’ learning needs, which cannot be done by traditional formal learning space (Moreland, 2015).

Therefore, informal learning space plays a vital role in university lives. A report shows that students usually have higher levels of engagement when they use informal learning space than other formal space (Painter et al., 2012), especially coffee shops. Moore & D’Souza (2013) did a study which indicates students tend to study more if they are at coffee shops. However, Steel Case Company has discovered that current students’ demand for informal learning activities has exceeded what cafés could offer. (Steelcase Education, 2015a)
The purpose of this study is to analyze current trends in the design of campus coffee café, with a focus on how students utilize the space as an informal learning environment. With the shift of student learning behavior in modern higher education campuses, many learning opportunities happen outside the classroom (Morrison, 2016). Based on the large demands of informal learning space, much of the literature explored the interesting characteristics of informal learning space that satisfy students’ preferences. However, there were few studies that showed the design of on-campus coffee shops as evidence-based design.

This study integrates the aspects of on-campus coffee shops and informal learning space together based on investigations with students and the current on-campus coffee shops to provide an ideal informal learning space.

**Objectives:**

1. How physical design of informal learning space affects student learning behaviors.
2. Describe in detail the phenomenon of informal learning behaviors in on-campus coffee shops.
3. Investigate the use of informal learning space by students; explore the issues and problems of current informal learning space and reveal the factors that can satisfy students at the on-campus coffee shops while engaging informal learning.
4. Create an ideal framework for an informal learning environment within on-campus coffee shops.
Investigation Questions

1. What are the interconnections between informal learning and on-campus coffee shop? [Literature review]

2. How do students utilize the on-campus coffee shops while engaging informal learning? [Observation]

3. How do current university students choose places for informal learning activities on campus? [Questionnaire]

4. How can students’ perceptions of an informal learning space be integrated into the design of an on-campus coffee café to better support an informal learning environment? [Design Illustration]

Scope of Limitations

This study was conduct to potentially enhance the interiors of on-campus coffee shop to better support students’ informal learning activities and ultimately find Interesting factors that could impact informal learning behaviors. This investigation focuses on how students engage in informal learning activities. Through casual and systematic observations, the study aims to reveal behavior that could further affect design decisions.

Although this investigation was carefully prepared, it is necessary to address the limitations. First, the definition of “on-campus coffee shop” there are many coffee spots throughout Iowa State University. The type of on-campus coffee shop featured in this study focuses on types that are in the Fredericksen Court Community Center and The Hub, which offer open seating areas and a variety of food and drinks. There are other types of on-campus coffee shops that might yield different results. Second, the survey was done under suboptimal
conditions, and lacks ideal controls of certain variables. In the future, it may be useful to reexamine survey results under more controlled circumstances.
CHAPTER 2. LITERATURE REVIEW

Generation Y College Students

A decade ago, the first wave of Generation Y students were seen as fresh blood injected into colleges, which forced educational institutions to deal with a new population of learners with unique characteristics (Geners, 2006b). Therefore, designing an ideal informal learning space in on campus café needed to consider this group of people. The first step was discovering what Generation Y is and what differences there are between them and previous college students. The next step is to understand what their characteristics are and identify their learning styles.

In the literature, there are different definitions of the age range for Generation Y. However, their differences are negligible. In general, Generation Y refers to the people who were born from 1980 to 2000. Therefore, they are also known as the millennials, internet generation, iPod generation, etc. (Schofield & Honore, 2010). Because of the different environment compared with previous generations, this group of people have their own way to see and think (Tapscott, 2013). Generation X (1965 – 1980) is usually characterized as hard working, independent, and skeptical (Reilly, 2006). In contrast, Generation Y is quite different in that, they are known as social, confident, honest, and free (Schofield & Honore, 2010).

The Generation Y is the first group of people who grew up with digital and cyber technologies (Geners, 2006b). Their daily lives are highly dependent on their digital devices. Pearson Student Mobile Device Survey reports that in 2015, 86% percent of college students regularly use a smartphone and 89% of them use a computer every day (Poll, 2015). The survey also shows that 36% students in college are the first people to check out a new
electronic device or gadget (Poll, 2015). Of Generation Y, 70% think tablets will effectively replace textbooks (Poll, 2015). Oblinger also states that Generation Y seeks immediate information and understanding from the web and other digital devices, rather than looking through textbooks (Oblinger, 2003).

**Characteristics of Generation Y**

“There is something happening here. Growing up digital has had a profound impact on the way this generation thinks, even changing the way their brains are wired (Tapscott, 2013, p. 1689).” It is quite clear that Generation Y has different learning styles compared with previous generations. They are confident, honest, demanding, vociferous, and have high expectations when they come to learn (Schofield & Honore, 2010). “When it comes to learning, Generation Y do not simply hold preferences, but expectations (Schofield & Honore, 2010, p. 57).” There are five distinct characteristics the can be summarized from the literature for Generation Y; freedom, customization, multitask learning, social interactive, and entertainment.

**Freedom**

Due to the internet, the behavior of the working and learning style also have been changed. The internet enables people to access information from almost anywhere which gives the freedom to choose where and when to work or learn. They are confident with everything; and they believe that they can do anything that no one can tell them not to (Tapscott, 2013). (Tapscott, 2013) did a survey online which shows that more than half of the Generation Y in North American prefer to work in places other than an office or classroom.

**Customization**

Generation Y grew up in a child-centered world, therefore, they are accustomed to getting what they want and when they want it (Erickson, 2008). They usually do not follow
rules because they think rules are ineffective (Reilly, 2006). Customization is a good way to show their personalities. It is not only reflected in where or when Generation Y decides to learn, but also on the physical product and environment. (Tapscott, 2013) describes how his son customized his mouse, which is different from the factory settings. Each button on the mouse has a special function, which only the mouse owner knows. For the learning environment, every student has their own criteria for an ideal learning space (Moreland, 2015). In addition, there are many learning types in the digital world. Therefore, a uniform or a formal study area cannot meet their demands. They need to customize the space to fit their own preferences. A survey shows that 100% of students who study in coffee shops adjust their physical surroundings to fit their needs (Moore & D’Souza, 2013). “Informal learning spaces provide students with a choice of destinations to support their individual learning need (Steelcase Education, 2015a, p. 41).”

**Multitasking Learning**

“Generation Y are most comfortable when they are engaged simultaneously in multiple activities such as listening to music, texting and writing (Schofield & Honore, 2010, p. 57).” Compared with the previous generations, Generation Y is very good at multitasking (Schofield & Honore, 2010). They have low boredom thresholds and short attention spans, therefore, multitasking can stimulate their attention and let them keep interest on the task (Schofield & Honore, 2010).

**Social Interactive**

The internet is helping students build a larger social net which can be reached anytime and anywhere. Generation Y does not want isolated lecture based information; they really value the interaction between people and exchange information with each other (Schofield & Honore, 2010). However, the interaction here does not mean physical
interaction. Generation Y prefers online interaction rather than face-to-face (Turkle, 2012). Even though they sit together, there is less communication or interaction with each other (Turkle, 2012). They just enjoy being there as participants in a studying community (Crook & Mitchell, 2012)

Entertainment

Since Generation Y has low boredom thresholds and short attention spans (Schofield & Honore, 2010), environment stimulation and attraction is important (Tapscott, 2013). For previous generations, work and fun were clearly separated, but not for Generation Y. There is no clear dividing line between these two modes, instead, they are merged in the same activity (Tapscott, 2013). A study states that Generation Y are kinesthetic and visual learners (Reilly, 2006). It seems like previous teaching style, which is teacher-centered, does not fit this group of people (Reilly, 2006). Because of this digital world, Generation Y grew up with lots of visual stimuli (Schofield & Honore, 2010). (McCrindle, 2006) reported that 52% of Australian students prefer to learn kinesthetically, 42% of them prefer visually, and 6% are primarily auditory learners.

In conclusion, the fast development of technology, has changed Generation Y’s lifestyle. They have different views on the world compared with previous generations. They prefer having control over when and where to learn. In terms of the physical environment, they would like to customize the surroundings into their most preferable settings. Social interaction and collaborative learning are popular with this generation; however, it is not face-to-face but through digital devices. Even though students are in the same room, they communicate less. In other words, they like alone together. Generation Y is also good at multitask learning, which means they merge learning and entertainment together to stimulate
their desire for learning. Knowledge of these characteristics of Generation Y, enables designers to design more suitable informal learning spaces.

**Learning**

The way students learn is in a time of transition in the 21st century. The environment around students need to be redesigned to match new learning methods and learning tools. Before designing an ideal informal learning space, the definition of learning needs to be clarified?

According to (Ormrod, 2014, p. 35), learning can be separated into three parts. First, learning is a permanent change, it is not just remembering a phone number for the short-term. Second, learning involves mental representations or associations. Third, all of these changes are due to experience. In conclusion, “learning is a long-term change in mental representations or associations due to experience.”

Learning is typically consisted of two categories – behavioral and cognitive (Ertmer & Newby, 2008). “Behaviorism equates learning with changes in either the form or frequency of observable performance. Learning is accomplished when a proper response is demonstrated following the presentation of specific environmental stimulus” (Ertmer & Newby, 2008, p. 60). By constantly stimulating and reinforcing the desired response, the behavior of the learner will ultimately change to match the desired response. As opposed to taking an active role in exploring the environment, the learner is depicted as being reactive to conditions in the environment (Ertmer & Newby, 2008).

Cognitivism is “the specific things people mentally do as they try to interpret and remember what they see, hear, and study. It has a profound effect on what they specifically learn and remember (Ormrod, 2014). It is the way people understanding knowledge through people’s thoughts, experience, and senses. In the late 1950s, the emphasis was no longer
strictly on behaviorism, but on mental process. Psychologists and educators gradually began to shift from behavioral orientation to cognitive orientation (Ormrod, 2014). In other words, behavioral processes are the basic of learning and cognitive processes are the higher level of learning.

**Learning Mechanism**

**Information Processing**

“Cognition and learning are central concepts in educational psychology” (Collins, Greeno, & Resnick, 1996, p. 25). Huitt describes the information processing approach to cognition with three steps, which are sensory memory, short-term memory, and long-term memory (Huitt, 2003).

Sensory memory is the first step people perceive signal from the external stimulus. Anything in the surrounding environment can be input information, such as smell, hearing, and vision. However, this memory is a very short memory which can only last for 0.5-3 seconds. The brain will pay attention to a stimulus if it has an interesting feature, then will transfer it to the next step which is short-term memory (Huitt, 2003). Short-term memory is also called working memory. The brain will pay attention to external stimulus and internal thought to understand these inputs. The memory in this stage will initially last around 15 to 20 seconds. If these inputs are rehearsed, they get the chance to encode to the long-term memory (Huitt, 2003). Long-term memory is the inputs people receive which becomes implanted in their minds. Sometimes, these inputs are not realized, but they are still there and can be easily retrieved when needed (Huitt, 2003).
Attention

The cognitive process can be briefly divided into four parts; attention, encoding, storage, and retrieval. “Attention is essential for most learning and memory. If the information in the sensory register doesn’t get a learner’s attention, it presumably disappears from the memory system” (Ormrod, 2014, p. 35). Therefore, to attract learners’ attention is the most important step for learning.

There are four types of attention people use during their daily activates, which are sustained attention, selective attention, alternating attention, and divided attention (Lee, 2005).

1. Sustained attention refers to when people focus on a specific task for a long period of time, such as reading a book.
2. Selective attention refers to when people focus on one activity in midst of many activities, such as listening to a friend at a loud party.
3. Alternating attention is used to alternate back and forth between tasks, such as reading a recipe and preparing a meal.
4. Divided attention refers to completing several tasks at same time, such as doing homework while listening to songs.

The first two types of attention are used when people only have one task or activities that need to be focused. Divided attention is usually referred to as multi-tasking, which is the characteristic for Generation Y students (Tapscott, 2013). It is a common phenomenon that teachers and parents complain that students are quick to lose their attention, no matter in class or doing their homework. They have low boredom thresholds and short attention spans (Schofield & Honore, 2010). However, (Tapscott, 2013) argued that attentional ability for
today’s students is normal. They only prefer to focus on the task which they are really interested in (Geners, 2006b).

The most comfortable way for Generation Y to conduct their task is engaging simultaneously in multiple activities such as listening to music, writing, and talking (Schofield & Honore, 2010). Tapscott depicts how today’s student conduct their attention on multitasks. “They are faster than I am at switching tasks, and better than I am at blocking out background noise. They can work effectively with music playing and news coming in from Facebook. They can keep up their social networks while they concentrate on work” (Tapscott, 2013, p. 1699).

In conclusion, Generation Y students can shift their attention rapidly from one to another and pay more attention to things that they are really interested in (Oblinger & Oblinger, 2005). It is obvious to see that before in-depth learning, using the environmental elements (lighting, sound, heat, etc.) to attract students’ attention is an essential step. It lays the foundation for the further investigation and learning.

**Learning Paradigms**

Due to the versatility of learning, it could be in many forms, such as formal learning, informal learning, active learning, collaborative learning, and social learning. With the change of environment, the form of learning may vary as well. Previous literature review has mentioned certain characteristics of Generation Y, such as multitasking, socialization, collaboration, and customization. Besides learning from the structured formal classroom settings, learning also takes place outside of the classroom for Generation Y. They have adapted to a learning style that is very informal.
Informal Learning History

(Coffield, 2000, p. 88) states “if all learning were to be represented by an iceberg, then the section above the surface of the water would be sufficient to cover formal learning, but the submerged two-thirds of the structure would be needed to convey the much greater importance of informal learning.” Cross also states that people learn more in the coffee shop than in the classroom (Cross, 2007). It is obvious how important informal learning is for students.

Recent years, researchers have paid much attention to informal learning. Actually, informal learning style has appeared much earlier than people know, which is around 1960s and 1970s (Carliner, 2013). Carliner has organized and summarized a timeline that shows the development of informal learning after the emergence of formal education (Carliner, 2013).

Table 1. The timeline of informal learning.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Type of Informal Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before formal School</td>
<td>Learning from daily life – the school of life</td>
</tr>
<tr>
<td>1960s and 1970s</td>
<td>Self-directed learning</td>
</tr>
<tr>
<td>1970s and 1980s</td>
<td>Adult learning theory, human performance technology, computer based training, and informal (then free choice) learning</td>
</tr>
<tr>
<td>Early 1990s</td>
<td>Performance support and edutainment</td>
</tr>
<tr>
<td>Late 1990s</td>
<td>Knowledge manage and e-learning</td>
</tr>
<tr>
<td>Late 2000s</td>
<td>Informal learning</td>
</tr>
</tbody>
</table>


Six forms of informal learning have been summarized by Carliner in order to demonstrate its development (Carliner, 2013). First of all, “school of life”, it can be referred as learning through observations where a less experienced worker learns with a more experienced one by watching. Secondly, the self-directed learning means that the workers are encouraged to learn and develop their skills on their own. After self-directed learning, there is adult learning theory, the human performance technology and the computer-based training. These demonstrate how adults need recourses and motivation for learning. In the early 1990s,
**edutainment**, the electronic performance support system that the system assists the student to achieve better learning results, is the blend of learning and entertainment. Knowledge management and e-learning rose in the late 1990s, knowledge management mean that with the assist of the personal computers, learners could capture, catalog, transform, and disseminate knowledge. With the popularity of the internet, leaners could gain access to many other learning programs. The term *informal learning* starts to adapt in the late 2000s, after the publication of Jay (Cross, 2007) book: *Informal Learning: Rediscovering the Natural Pathways That Inspire Innovation and Performance* in 2007. The rise of social media, development of internet resource (such as Wikipedia) provides greater opportunities than ever for people to learn. In the future, people can get instant and ubiquitous knowledge which knowledge itself is moving from the individual to the net.

The concept of informal learning has evolved over the past decades. The informal learning concept started to rise in the late 2000s. During this period of time, the rise of Generation Y also affected the direction how the informal learning conceptualizes.

**Formal Learning**

Formal and informal learning is often mentioned throughout the literature, as these are recognized as the two major categories of how people obtain their knowledge. Therefore, it is necessary to conceptualize formal and informal learning. The conceptualization of these two forms of learning provide a clear idea of how formal learning and informal learning differentiate from one another.

Formal learning, known as the school learning (Resnick, 1987), is usually provided by educational or training institutions and is highly structured in its curriculum, learning objectives, duration, content, method, learning activities, and assessment. The end of formal learning often leads to degrees, credits, diplomas, qualifications or certifications (Eshach,
Due to the highly structured nature of the formal learning system, the system offers more control over the learning experience and outcome (Cournoyer, 2012).

**Informal Learning**

Generally, the phrase *informal learning* suggests a vital distinction from the *formal learning* process (Callanan, Cervantes, & Loomis, 2011). However, depending on the overall conceptualization of learning, the meaning of informal learning may vary. Due to the complex conceptual and methodological challenges, the definition of informal learning is even more difficult to define (Hofstein & Rosenfeld, 1996; Osborne & Dillon, 2007). As opposed to the formal learning or school-based learning, some research has suggested that the important distinction between the two forms of learning is the location where learning engages. In one definition, informal learning means the learning that occurs outside of the classroom environment (Callanan et al., 2011; Sefton-Green, 2004). The location maybe one of the most distinct difference of the two, but informal learning differs from formal learning on other important attributes as well.

The structure and process of informal learning, as well as the relationship between the instructors and the learners of informal learning are fundamentally different than formal learning (Eshach, 2007; Laurillard, 2009). The purpose of informal learning is different from a directed, curriculum-based, assessment driven, and qualification-based endeavor. Informal learning may also be the byproduct of leisure activities that happens unpredictably, accidentally, and spontaneously (Kerka, 2000; Marsick & Watkins, 2001; Sefton-Green, 2004). As we know, learning is a life time continuum of activity, it does not just happen during school-age. Children can learn many thing at home and in their communities before
school age, adults continue to learning at workplace and everyday activities (Lave & Wenger, 1991). When there is no teacher or structured curriculum present to the learners, and the learners have more control over the opportunities to learn, as well as the content, pace, and evaluation, the learning tends to be more informal (Furlong & Davies, 2012).

Malcolm, Hodkinson, and Colley have summarized a good range of criteria for the formal and informal styles of learnings.

Table 2. Attributes and Aspects of Formality/Informality in Learning.

<table>
<thead>
<tr>
<th>No.</th>
<th>Formality/Informality in Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education or non-education</td>
</tr>
<tr>
<td>2</td>
<td>Location (school, classroom or coffee shop, home)</td>
</tr>
<tr>
<td>3</td>
<td>Voluntarism (learner/teacher intentionality/activity)</td>
</tr>
<tr>
<td>4</td>
<td>Extent of planning or intentional structuring</td>
</tr>
<tr>
<td>5</td>
<td>Nature and extent of assessment and accreditation</td>
</tr>
<tr>
<td>6</td>
<td>The time-frame of learning</td>
</tr>
<tr>
<td>7</td>
<td>The extent to which learning is tacit or explicit</td>
</tr>
<tr>
<td>8</td>
<td>The extent to which learning is context-specific or generalizable/transferable</td>
</tr>
<tr>
<td>9</td>
<td>External determination or not</td>
</tr>
<tr>
<td>10</td>
<td>Whether learning is seen as embodies or just “head stuff”</td>
</tr>
<tr>
<td>11</td>
<td>Part of a course or not</td>
</tr>
<tr>
<td>12</td>
<td>Whether outcomes are measured</td>
</tr>
<tr>
<td>13</td>
<td>Whether learning is collective/collaborative or individual</td>
</tr>
<tr>
<td>14</td>
<td>The status of the knowledge and learning</td>
</tr>
<tr>
<td>15</td>
<td>The nature of knowledge</td>
</tr>
<tr>
<td>16</td>
<td>Teacher – learner relation</td>
</tr>
<tr>
<td>17</td>
<td>Pedagogical approaches</td>
</tr>
<tr>
<td>18</td>
<td>The mediation of learning – by whom and how</td>
</tr>
<tr>
<td>19</td>
<td>Purposes and interests to meet needs of dominant or marginalized groups</td>
</tr>
<tr>
<td>20</td>
<td>Location within wider power relations</td>
</tr>
<tr>
<td>21</td>
<td>The Locus of control within learning process</td>
</tr>
</tbody>
</table>


All of the attributes listed in Table 2 can be summarized into five aspects which are process, location, purpose, content, and consciousness.
Process; who controls and assesses learning. In the most formal situations, learning is controlled and defined by the instructor, who establishes objectives and (through assessments) determines whether learners have achieved the objectives. In the least formal situations, learners establish their own objectives and criteria and determine when the learning is complete.

Location; where the learning occurs. In the most formal situations, learning occurs in a place intended for learning, such as a traditional or virtual classroom. In the least formal situations, learning occurs organically in the context of everyday life.

Purpose; whether learning is a primary or secondary goal of the activity. In the most formal situations, learning is the primary goal. In the least formal situations, learning is a by-product.

Content; whether the topic of study is for immediate or long-term use. Acquisition of content (such as the concepts underlying an occupation) tend to have long-term use and is considered more formal, while content about processes and procedures in a particular context has more immediate impact on job performance and is considered more informal.

Consciousness; the extent to which learners are aware that learning has occurred. In the most formal situations, learners have a high level of awareness that learning has occurred (or that it should have occurred). In the least formal situations, learners may not realize that they have learned something until long after the experience (Carliner, 2012).

Above all, in this study, informal learning can be defined as a learning style that learners have control over their own learning objectives, criteria, and determinate the completion of learning. It can occur anytime and anywhere without any restriction on the location. Informal learning is often an by-product where learners may not realize the learning
process and consequences (Carliner, 2012). From the characteristics of informal learning, informal learning can be categorized into three forms. 1) Self-directed learning where an individual is conscious about the purpose of learning something and he or she is aware of the learning action. 2) Incidental learning where an individual does not have any intention of learning but realized learning has taken place from certain experience. 3) Socialization which refers to internalization of value, attitudes, behavior, skills, etc. that occur during everyday life.

In today’s educational system, the changing structure of the education system is needed due to the development of technology, the appearance of the internet and social media, and the changing role of teachers and students (Hamilton, 2011). The rise of mobile devices, such as smartphones and laptops, made it possible for students to be able to learn from any location. Technology is just one of the aspects that could affect learning style. There are many other aspects such as physical and behavioral environment that also can affect learning style.

**Informal Learning Environment and Students’ Behavior**

**Behavioral Environmental**

“Environmental influences on mood and behavior are pervasive and important” (Bell, Greene, Fisher, & Baum, 2001, p. 47). Therefore, human and environment cannot be considered separately and have innumerable links between each other. Bell has analyzed the relationship between environment and humans into six theoretical perspectives; arousal, load, adaption level, behavior constraint, stress, and ecological psychology (Bell et al., 2001).

**The Arousal Perspective**

Arousal has significant consequences for people’s behavior (Bell et al., 2001). Whether pleasant or unpleasant stimulation, both can raise the level of arousal. In addition,
the level of how pleasant or unpleasant a stimulation can be is due to the people around us, the perception of threat, and other physical aspects of the environment (Bell et al., 2001). According to (Yerkes & Dodson, 1908), arousal has a significant influence on people’s performance. The relationship between arousal and performance presents an inverted-U shape, as depicted in Figure 1. The performance is increasing with the increasing level of arousal. However, when the level of arousal reaches a certain level, then the performance will decrease with the increasing level of arousal. It is obvious that, low arousal is not conducive to maximum performance and it is hard for people to concentrate on the task with an extremely high arousal. In other words, the optimal performance occurs with the medium level of arousal (Yerkes & Dodson, 1908).

![Figure 1. The Yerkes-Dodson law predicts an optimal level of performance for simple and complex tasks, with arousal below or above the optimum resulting in performance decrements.](image)

(Cross, 2007) points out that people have a better study performance in coffee shops rather than in classrooms. The reason is the arousal in the classroom is too low and cannot arouse students’ attention. However, there are many elements, such as background music, food, color, lighting, and etc. that can stimulate students and improve study performance. Therefore, when designing informal learning space, designers need to design certain arousing environmental features to help students heighten their learning performances.
The Environmental Load Perspective

The environmental load approach explains environment-behavior relationships (Bell et al., 2001). Brown and Poulton examined participants driving in a residential area (relatively small number of important inputs) and in the parking lot in a crowded shopping center (relatively large of number of important inputs) with listening to a number series and determine which number changed from one sequence to the next. The result shows that participants who drove in a shopping mall parking lot made more errors than who drove in a residential area. Because in the shopping mall, participants put more attention on the important stimuli connected with driving and they ignored the less important stimuli (I. D. Brown & Poulton, 1961). “Generally, stimuli most important to the task at hand are allocated as much attention needed, and less important stimuli are ignored. If these less important stimuli tend to interfere with the central task, ignoring them will enhance performance” (Bell et al., 2001, p. 47). This theory can also apply to informal learning space, especially in coffee shops, where there are less important stimuli, such as background music. Students can ignore them and be more focused on their tasks, which can lead to enhanced performance.

In the university, most of the students experienced overload by the end of the week of final exams. Prolonged concentration on a task leads to directed attention fatigue (Kaplan, R. & Kaplan, S. 1989). This attention fatigue can be seen as a state of mental exhaustion similar to overload (Kaplan, R. & Kaplan S., 1989). This fatigue state can be recovered in a restorative environment, which has four characteristics:

1. Being away, or in something other than your normal environment.
2. Extent, or providing and experience that is extended in time and space.
3. Fascination, or being interesting and engaging.
4. Compatibility, or the ability of the environment to support what you intend to do (Kaplan, R. & Kaplan, S., 1989).

On-campus coffee shops are the place that have all the characteristics listed previously. It is a good choice for students to recover from the fatigue state. Many reports state that people who engage in activity in a restorative environment typically report increased interest and acuity in dealing with the task that led to the attention fatigue (e.g., Kaplan, Bardwell, & Slakter, 1993).

**Adaption Level Perspective**

The research evidence supports that too much or too little stimulation can have negative effects on humans’ behavior and emotion. Only an intermediate level of stimulation would be ideal (Bell et al., 2001). All the elements in the space have the potential to be stimulation for users, such as temperature, noise, and even the complexity of roadway scenery (Garling & Biel, 1998). Humans will change their adaptation level to adapt to the different environment stimuli. People usually prefer an optimal level of stimulation (Bell et al., 2001).

(Wohlwill, 1974) puts forward categories of environment-behavior relationships that should conform to this optimal level hypothesis: intensity, diversity, and patterning.

**Intensity**

“Too many or too few people around us can be psychologically disturbing. Too little or too much auditory stimulation has the same unwanted effect” (Bell et al., 2001, p. 56).

Too much auditory will lead to attention failure, even lead to unpleasant mood. However in a completely quiet environment, people will become very unnerved after only a few minutes (Bell et al., 2001). Therefore, how to control the stimulation level in an optimal range is very important when designing a space.
Diversity

A monotonous environment makes people feel boredom and an environment with too much diversity will also cause an eyesore (Bell et al., 2001). Wohlwill indicates that when the stimulation of human-built scene reach the intermediate level, they will have a maximized attractiveness and degree of pleasant feelings (Wohlwill, 1974).

Patterning

Patterning is “the degree to which a perception contains both structure and uncertainty” (Bell et al., 2001, p. 88). Both too simple and too complex stimulation structures can cause disturbed feelings. In a very complicated space, people have difficulty imposing a perceptual structure on it; therefore, it will lead to stress. However, in a very monotonous space, every element is constant and predictable and people lose the intention and interests to explore it (Bell et al., 2001). When designing a space, both extremes should be avoided in order to maintain an optimal stimulation for the users.

(Wohlwill, 1974) indicates that it is hard to define the level of optimal stimulation because everyone has their own optimal stimulation level. For example, in high altitudes with less oxygen, it is very hard for most of the people to maintain consciousness. However, local people can adapt it easily feel comfortable. This shows everyone has their own adaptation level. The adaptation level will not remain the same and it will change with the changing of time, experience, and exposure to a different level of stimulation (Bell et al., 2001).

(Sonnenfeld, 1966) presents an opinion to help people reach the optimal adaptation, adjustment. “Adaptation refers to changing the response to the stimulus, whereas adjustment refers to changing the stimulus itself” (Bell et al., 2001, p. 74). In a high developed technological world, adjustment is clearly a realistic option that people may prefer it over adaptation (Bell et al., 2001). If people think the color of the wall is too cold, they will
change the color until they feel comfortable. This is also one of the characteristics of Generation Y students. It is easy to see in a coffee shop, students continuously change the table combinations to meet their requirements. They prefer to change the environment to fit them rather than change themselves to fit the environment.

**The Behavior Constraint Perspective**

The behavior constraint means “some type of interference is causing goal blockage. The interference leading to goal blockage may be either in a form of belief or may actually cause impairment of task performance resulting from the constraint posed by the environment. Once the individual perceives that the environmental events are interfering with goal attainment, individuals will feel uncomfortable or experiences negative feelings. They will attempt to restore or regain their freedom by removing the obstacles” (Nagar, 2006, p. 390).

Behavior constraint can be presented from two aspects, which are Brehm’s theory of psychological reactance and Sommer’s conceptualization of personal space (Nagar, 2006). When the situation is out of control, what happens next? First, people will experience discomfort and negative affect; however, they will try their best to reassert their control over the situation. This is the theory by Brehm (Brehm S. & Brehm W., 1966), which is called psychological reactance. Brehm (1966) states that in human behavior and perception, maintenance of freedom of choice is one of the most important motivating factors. When people lose control for their surroundings, they will become anxious. However, if they reassert their control over the situation, which can enhance a person’s performance and mental outlook (Bell et al., 2001). There was an experiment conducted by (Glass & Singer, 1972), where participants were told to stay in a room full of noise. At first, they felt really anxious until they were told there was a button that can control the noise. By simply being
told about the existence of the button can reduce or completely eliminated the negative effects from the noise.

According to Sommer, personal space is an invisible boundary surrounding the individual, which is also called an *emotionally charged* zone, where intruders are not welcome (Robert Sommer, 1969). Personal space is not stationary, it will change with the changing of environment. Within the on-campus coffee shops, there are fewer bound restrictions around students. It is necessary to understand how the spatial factors influence the students’ behaviors, thus affecting their decision to select coffee shops to study outside the formal space.

**The Environmental Stress Perspective**

All the elements in the environment, such as noise and crowding, can be seen as stressors, which can cause emotional, behavioral, and physiological changes (Bell et al., 2001). When these stressors exceed one’s personal coping capacities, stress will occur (R. S. Lazarus, 1966). If people prolong exposure to stress that can lead to serious aftereffects, such as mental disorders, performance decrements, and lowered resistance (Bell et al., 2001). Lazarus and Cohen (1977) summarized three aspects that present the importance of environmental stress. First, stress effects are of great importance to satisfaction and morale. Second, stress emotions strongly influence every aspect of adaptive functioning, such as problem-solving and social competence. Last, environmental stress can cause stress emotions such as anxiety, fear, jealousy, and sadness (Lazarus & Cohen, 1977).

For the learning environment, stress’s effect on person-environment fit is commonly used to evaluate the environment (Fraser & Fraher, 1983). The definition of person-environment fit cannot only be defined by stress or stressor, which should be defined by the degree of both (J. R. P. French, Caplan, & Harrison, 1982). The fundamental premise of
person-environment fit theory is that stress occurs when there is misfit between the person and environment (Edwards, Caplan, & Harrison, 1998). In other words, when the environment meets the demands from people or vice versa, then people will have optimal performance.

In today’s university, the demands of the learning environment from the students is different from before. People attempt to adapt or rearrange the space to improve person-environment fit (J. R. French, Rodgers, & Cobb, 1974). Therefore, in order to design an ideal on-campus coffee shop for informal learning activities, it is necessary to understand how Generation Y manage to improve the fit between themselves and the informal learning space.

**Ecological Psychology Perspective**

Ecological views are the coactions of environment and behavior (Barker, 1968). Environment influences behavior, at the same time, behavior influences the environment. This cycle alternation forms the ecology. The behavior setting consists of the interdependence of standing patterns of behavior and physical milieu (Bell et al., 2001). Physical milieu is defined as all the physical elements in the surroundings, such as the blackboard in the classroom. Standing patterns of behavior refer to the collective behaviors of the group, rather than just individual behaviors. “These behaviors are not unique to the individuals present, but they may be unique to the setting” (Bell et al., 2001, p. 105). These two elements cannot occur separately and are interdependent.

Based on Barker’s ecological psychology, (Gump, 1980) indicated that there are three basic aspects of ecology in schools; milieu, human components, and programs. Physical milieu is the details of the environment of school, such as the building, furniture, and seating arrangement. It provides a basic sense of the environment. The human components refer to other people in the environment, such as crowding and person density. Program is defined as
action structures which govern the schools, such as curriculum and regulation (Gump, 1980). None of these aspects can happen independently. The behaviors of students in the school are influenced not only by the physical environment, but also affected by the way the schools are programmed, structured, and managed.

In conclusion, when designing an on-campus coffee shop for informal learning, too much or too little stimulation will have negative effects on behaviors. To find out the optimal range of the stimulation in the environment is one of the goals of this thesis. In order to provide an ideal environment for student to have an optimal performance. In addition, to reduce the negative effect on their mood and their performance, providing enough space for students to rearrange their settings to meet their demands is necessary. It should note that “there is no reason to assume that only one mediator operates in any given environment-behavior situation” (Bell et al., 2001, p. 112). Therefore, it is important to analyze all the environment-behavior perspectives from a holistic view in order to create an ideal on-campus coffee shop for informal learning.

**Physical Environment**

Physical environment can affect the performance and behavior of humans (Bell et al., 2001), thus learning environments can also affect learners emotionally, with important cognitive and behavioral consequences (Graetz, 2006). The physical elements in the learning space can stimulate and engage people (Gee, 2006). These physical elements can evoke sensory stimulation such as visual, tactile, auditory, and kinesthetic and all of these sensory stimulation can influence memory and the intake of information (Prashing, 2005). Lippman (2010) explores the relationship between the environment and learns which is “the environment shapes the learners, and that learners influence their environment”.
Different environmental settings can cause different behaviors (Bell et al., 2001). For example, in a formal classroom, people will turn quiet and follow instructor’s commands. However, in an informal space, such as coffee shop, people can be really active.

(Keppell, Souter, & Riddle, 2013) defined informal learning spaces as spaces “that have been explicitly designed to encourage students to engage in both independent learning and peer learning that is often unscripted”. The literature review for this section will analyze the physical elements in the environment and create a better informal learning space in order to provide an informal learning space that is more suitable for current students’ demand.

**Layout**

Much of the literature points out that today’s learning form is different from previous ones. It has shifted from teacher-led experiences to peer-to-peer learning style (H. Wilson, 2009). Therefore, the layout of the learning space should be changed as well to meet today’s demands.

Obviously, a fixed layout, such as built-in furniture, fixed floor plan no longer fits today’s learning style. Flexibility is an essential characteristic of spaces that successfully support informal learning (Mcdaniel & C, 2014). This characteristic can allow students to adapt their physical environments to accommodate individual preferences.

Students prefer to control their environment (Lomas & Oblinger, 2006). A study shows that if students perceive themselves as the owners of the spaces, it will help the success of informal learning spaces (Tibbetts, 2008). Due to the increase of the learning styles (e.g., individual learning, collaborative learning, and group work), the informal learning space should keep pace with a variety of learning styles. Therefore, flexibility of the layout is a good solution for today’s learning style. In addition, adequate space layout for the informal learning space is also very important as movement of people and furniture to
different learning settings requires adequate space (Gee, 2006). If the space is not adequate, then diversity in learning methods can be limited.

Steelcase Education (2015) creates a framework called palette of place, presented in Figure 2. This framework helps explain how space can support the rhythm of learning across environments. The palette of place framework also supports students’ sense of ownership (Steelcase Education, 2015). It provides a range of spaces that can be used and can also help designers guide floor plan zoning. It consists of four types of structures; private/alone, public/alone, private/together, and public/together.

![Figure 2. A palette of place, by Steelcase, 2015, Active Learning Spaces, p8.](image)

Campus café spaces are used by most students. This framework helps support the many ways café spaces are used (Steelcase Education, 2015).

Private/Alone

With the rise of collaborative work, individual study is still necessary for learning. In on-campus coffee shops, creating study nooks throughout the space is helpful for students to focus on their works with less distractions.
Public/Alone

One of the characteristics for Generation Y is *alone together* (Crook & Mitchell, 2012). Public/alone setting can provide a space for students when social connections are important but individual study is required. For example, in on-campus coffee shops, providing enough power outlets and different seating postures that can attract more students.

Private/Together

This space can provide a visual or acoustic privacy for students when they are doing team collaboration and study. This space should be highly flexible in order to accommodate different group sizes and learning modes. In the on-campus coffee shops, these spaces should be located in some private spaces while still remaining connected to the large café space.

Public/Together

This space can support students brainstorming together and sharing their information and knowledge with each other. In the on-campus coffee shops, social hubs can provide a space for them to do team works before or after meals.

Music

As mentioned in the literature, Generation Y is good at multitasking. They are most comfortable when they are engaged simultaneously in multiple activities such as listening to music while writing (Schofield & Honore, 2010). They have low boredom thresholds and short attention spans; therefore, they need more stressors from the environment to attract them. Sound is one primary example of an environmental stressor that can affect students’ performance (Cassidy & MacDonald, 2007; Szalma & Hancock, 2011).

Music as a form of sound is very popular in informal learning space, especially in coffee shops. Many researchers noticed that Generation Y seems to like working in the *noise zone* and can work efficiently with music (Holeton, 2000; Tapscott, 2013). Bennett reported
that college students prefer to work in a space with some level of noise and activities rather than work in a totally quiet space (Bennett, 2007). In his study, 67% of participants mentioned music can help them to focus on their studies (Bennett, 2007). This is corroborated by the environmental load perspective theory from Bell (Bell et al., 2001). Environmental load perspective refers to when the less important stimuli (background music) tries to interfere with the central task (learning), ignoring the music will enhance performance (Bell et al., 2001).

However, if the music is unwanted and unpleasant, it will become noise for people and will disrupts the activity (Nassiri et al., 2013). Therefore, not all music can have a positive effect on students’ learning performance. Different types of music may have different effects (Radocy & Boyle, 1998). For instance, if the music is very popular, then it will reduce performance on reading comprehension (Fogelson, 1973). Rhythmic complexity, tonal range, and repetition can be considered information load for the music (Kiger, 1989). Low information load music can improve results on reading comprehension task compared to silence (Kiger, 1989). In contrast, high information load music can detrimentally affect performance on the task (Kiger, 1989). High information load music can cause arousal, which can produce distraction and reduce performance (Cassidy & MacDonald, 2007). Low information load music provides optimally arousing conditions. Therefore, music plays an important role in the informal learning space.

**Color & Lighting**

Color and light are major elements in the architectural environment, which can influence psychological reactions and physiological well-being strongly (Mahnke, 1996). It is also seen as the easiest elements to change an environment (Jalil, Yunus, & Said, 2012). According to Mahnke (1996), “Color is not the property of objects, spaces, or surfaces; it is
the sensation caused by certain qualities of light that the eye recognizes and the brain interprets” (p.2). Even though color is subtle stimulation, it has salient impact on human lives physically, psychologically, physiologically and sociologically (Jalil et al., 2012).

**Color**

Different color hues can endue different impressions on people. It is a vast subject to give each hue of colors a description (Samani, 2012). (Mahnke, 1996) summarized an overview and convenient reference guide to the general effects and efficacy of major hues, which can be a reference guide for designing on-campus coffee shops for informal learning.

**Table 3.** Categories and Impressions Related to Color.

<table>
<thead>
<tr>
<th>Category</th>
<th>Impressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Arousing, Exciting, Passion, Love, Aggressiveness, Intensity, Fierceness</td>
</tr>
<tr>
<td>Orange</td>
<td>Exciting, Stimulating, Cheering, Jovial, Energetic, Extroverted, Sociable,</td>
</tr>
<tr>
<td>Brown</td>
<td>Comfort, Security, Natural (wood), Gustatory association (coffee, chocolate)</td>
</tr>
<tr>
<td>Yellow</td>
<td>Luminous, Happy, Cheerful, High-spirited, Hope, Wisdom,</td>
</tr>
<tr>
<td>Green</td>
<td>Relaxing, Refreshing, Quiet, Natural</td>
</tr>
<tr>
<td>Blue</td>
<td>Calmness, Security, Comfort, Sobriety, Contemplation, Cold, Quietness, Cleanliness, sadness</td>
</tr>
<tr>
<td>Purple/ Violet</td>
<td>Regal, Dignified, Exclusive, Lonely, Mournful, Pompous</td>
</tr>
<tr>
<td>White</td>
<td>Light, Spiritual, Hope, Holiness, Innocence, Clean</td>
</tr>
<tr>
<td>Black</td>
<td>Darkness, Power, Elegance, Richness, Dignity</td>
</tr>
<tr>
<td>Gray</td>
<td>Quiet, Calm, Dreary, Tedium, Passive, Lacks energy</td>
</tr>
</tbody>
</table>


**Lighting**

Lighting is also a vital element in interior design. Without light, color cannot be seen in any environment. It is an important factor to color appearance (Jalil et al., 2012). Light qualities of illumination and color temperature can effect student’s visual skills and performance (Mott, Robinson, Walden, Burnette, & Rutherford, 2012). Therefore, light and color should be considered holistically when designing a space.
According to (Gang & Haijing, 2011), people will learn more efficiently if the color temperature of fluorescent lighting is under the high and medium range (6500K-4000K). If the color temperature of fluorescent lighting is under medium range, learning becomes more relaxing. Different activities need different lighting.

Not only good artificial lighting could help people work efficiently, under the natural daylight, people will also have a high performance on their task. According to Leather et al., (1998), when people are working, they will have higher satisfaction with a window or with access to daylight within 15 feet than do people without a window (Leather, Pyrgas, Beale, & Lawrence, 1998). However, (Halliday, 2008) stated people will work more efficiently with a combination of good daylight and suitable artificial lighting color together.

In conclusion, lighting and color in interior space has direct influence on students’ learning performance (Samani, 2012). An appropriate color and lighting design can contribute to students’ attention during learning activities, which can also improve their performance and perception to surrounding (Jalil et al., 2012). According to the requirements of the color and lighting discussed previously, LED lighting system is a good solution for multitask space design. The color temperature and luminance of it can be changed easily to adapt different activities and could also achieve an energy saving up to 80% (Ono et al., 2012).

**Space**

In an informal learning space, not only the physical elements, such as lighting and furniture, can influence students’ mood and performance, but also the psychological elements, such as privacy and crowdedness, can influence them as well.
Personal Space

When people study or communicate in the public space, privacy is one of the most important aspects they consider. The mention of privacy can make people think of personal space. “Personal space is defined as portable, invisible boundary surrounding us, into which others may not trespass” (Bell et al., 2001, p.253). The function of personal space has been explained by many people based on different situations. The most relevant research is by E.T.H. (Hall, 1966), which defined personal space as a form of nonverbal communication. The main function of personal space is protection and communication (Bell et al., 2001). The distance between individuals can determine the quality and quantity of the exchanged information. It can reflect the type of the relationship between individuals and the type of activities as well (Hall, 1966).

The size of personal space is determined by four aspects; gender, race, culture, and personality (Bell et al., 2001). Based on Hall’s research, which used American Northwest mid-class households as research group, concludes four different personal space zones in their interactions with others; intimate distance, personal distance, social distance, and public distance (Hall, 1966).

1. Intimate distance

Intimate distance is defined as 0-1.5 feet. Between this space, people will get a strong stimulation from each other. The distance is too closed to see each other; therefore, smell, radiant heat, voice, breathing, and sensory factors become the primary mode to communicate.

2. Personal distance

The distance between this level of relationship is 1.5-4 feet. It is the distance where people can touch each other’s fingers when they raise up their arms. This distance can
provide an ideal space that people can provide more detailed feedback. It is suitable for teachers and students, families, classmates, and acquaintances.

3. Social distance

Social distance works better for impersonal and businesslike contacts, which is 4-12 feet. Sensory inputs are minimal based on this distance. People need to do extra work in order to have bodily contact. People who sit at this distance will not disturb each other and they won’t feel uncomfortable if they don’t say anything.

4. Public distance

Formal contacts (e.g., actor, politician) are considered public distance, which is 12 feet and more. With this distance, there is no sensory inputs nor detailed visual input. Because of the long distance between people, they need to raise their voice and use formal grammar to talk.

However with the fast development of the technology, not only has the way student study has changed, but also their perception of personal space when they study in public space (Sommer, 2002). Using cellphones among pedestrians in public space will increase signs of discomfort, reduces conversational length, and hastens their departures (Sommer, 2002). For the positive aspect using technology in public space is the music. Positive emotions of music (music delivered through headphones or speakers) can reduce the perception of personal space, which means allow people to come closer to each other (Pantelidou, Rebacz, Va, Tsakiris, & Tajadura-jime, 2011).

In conclusion, when designing the informal learning space in the coffee shop, only considering the standard size of personal space is not enough. Technological devices are one of the most vital aspects that will affect people’s perception of the space around them.
Third Place and Informal Learning

Ray (Ray Oldenburg, 1989) refers to coffee shops, bars, and barbershops as typical third places, these places fall somewhere between work and home. These are the places where local communities gather to relax and discuss a broad range of topic, allowing the life of the community to expand. The properties of third places outlined by (Ray Oldenburg, 1989) refers to places that are low profile, neutral, inclusive, accessible, accommodating, filled with regulars, conversational, and playful. However, that’s before the era of information and communication technologies (ICTs), such as Internet, smartphones, and social networks became an important part of our everyday life (Memarovic et al., 2014; Weiser, 1991). Contemporary ICTs have offered people more ways to communicate. It has also made the education system due for a change. The appearance of the internet and social media, the rise of mobile devices, and the changing role of students and teachers has made learning more flexible than ever.

Almost three decades have passed since Oldenburg established the characteristics and properties of third places, it is necessary to discuss the relevance of these properties in a more contemporary environment. This section of the literature review aims to summarize the related work on third place and find the properties and characteristics of third places in the context of a contemporary environment, as well as how informal learning has been impacted by the appearance of third places.

Third Place Characteristics

Oldenburg has outlined some of the specific characteristics of third places. 1) They are on neutral ground for people to socialize, no one plays the role of “host.” 2) They are level, social distinctions are not important in third places, people of different socio-economics strata attend. 3) Conversation is the main activity. The setting of the third place
may be a place for eating, drinking, or playing games, talking is always present. 4) These places are accessible and accommodating, both geographically and socially, there are no physical, policy, or monetary barriers to entrance. 5) They are a home away from home. Third places provide an out-of-home environment, but a home-feeling. 6) The mood is playful. The conversation in the third place is light and laughter is often heard. 7) Third places are low profile. They have a moderate style where pretentiousness is avoided. 8) Regulars shape the “tone” of the space (Ray Oldenburg, 1989). These are the essential characteristics of third places because they have established the unique communication experience and sociological benefits associated with these places.

When Oldenburg coined the definition of third places, ICTs were in their infancy in respect to their influence in shaping society. Today ICTs play a vital role in redefining the public sphere by enhancing physical space and multiplying the informational role of places and things (Anacleto & Fels, 2013). Influenced by the development of ICTs, today’s third places, such as coffee shops have little similarities compared to the coffee shop of the 17th century. Tables are small for private media consumption and the appearance of power outlet and Wi-Fi to attract customers. Third places no longer only serve as a place for conversations, but also play the role of internet-hub, meeting places, coffee distributor, and study room simultaneously (Memarovic et al., 2014). Memarovic et al. engaged a field study in Paris, France in order to achieve a better understanding how third places have changed since the emergence of ICTs (Memarovic et al., 2014). The places they have chosen follows the paradigms and characteristics of Oldenburg’s definition of third places. The findings of the field study show some of the characteristics of third places described by Oldenburg have evolved, following changes in the society and communication technologies.
Additional to the shifts of existing third place characteristics, several new characteristics have also been discovered. 1) People could have the options to discover a third place without the need to visit it. 2) Third places now tend to have a focus on the types of activities they support and atmosphere they generate. 3) Social activities are not only limited to physical locations, but are extending through social media. (e.g., by “like” or “follow” it on Facebook (Memarovic et al., 2014).

Along with the ICTs, another group has boomed in the past is Generation Y. Generation Y is often considered as confident, social, honest, and free (Schofield & Honore, 2010). They are the first group of people who grew up with digital cyber technologies (Geners, 2006a). The first wave of Generation Y was being ejected into college ten years ago. Today, most of the students studying in universities can be categorized as Generation Y. Third places play an important role in everyday lives of Generation Y students. They often see third places as places of refuge where they could go and relax, rejuvenate and refresh their minds. It is a place away from classrooms, a place to read and finish school work, and a place to hang out with friends (Crick, 2011). In third places, Generation Y students are able to shift working, playing, and learning easily. However, (Crick, 2011), through the conduct of a focus group experiment at the University of the West Indies’ Mona campus located in Kingston, Jamaica, points out that different than the characteristics Oldenburg described, Generation Y students are now expecting to have a range of third places based on their specific demands. Modern third places feature different moods and have specific activities they support, which coincides with the dynamic preferences of Generation Y students in terms of choosing third places.
Informal Learning within Third Places

Generation Y students generally have no difficulty finding places that they consider third places. The essential core value of these spaces is that they have provided a place for social interactions, such as conversing, eating, drinking, reading, and studying (J. H. Banning, Clemons, McKelfresh, & Gibbs, 2010). Within any learning environment, it is important to have places for social disclosure (James H. Banning, 2002). It is through this process of social disclosure, that informal learning occurs (Loomis, 1987). Social disclosure serves to help promote students’ growth and development. In other words, third places are the spaces that may encourage and support informal learning when students are away from home and classrooms.

ICTs not only reshaped today’s third places, they have also shaped the learning styles of modern students (Generation Y), and made the education system seek new approaches to learning and teaching. Educational institutions are seeking to offer a more dynamic learning experiences, from structured, formal, teacher-led experiences to moments of less structured, peer-to-peer, informal, or self-directed learning (H. Wilson, 2009). In order to accommodate these rapidly changing pedagogies, environments can be designed to support and adapt to different learning needs of students (Jisc, 2006).

In order to design and build spaces to support Generation Y students’ dynamic learning demand, it is important to fully understand the characteristics of Generation Y. Five distinct characteristic of Generation Y have been identified in the previous review of literature (Chapter 1.1.1), which are freedom, customization, multitask learning, social interactive, and entertainment. In terms of social interaction, Generation Y values the interaction between people and exchange information with each other (Schofield & Honore,
2010). It is fair to say that the growth and development of Generation Y students are largely affect by social disclosure.

With the development of ICTs, today’s third places come in different shapes and sizes. In other words, third places may provide different atmospheres and support different social activities (Crick, 2011). Despite the dynamic changes of third places since Oldenburg established the definition and characteristics of third places; third place, whether physical or virtual, is still a place that offers social interactions at its core.

It is worth mentioning that food and drinks also make a big contribution on the ideal informal learning space. O’Connor (2005) found that a learning space with food and drinks can make the space more attractive to learners. There were 63% of learners at Sawnee University reported that drinks and foods can help them to focus on studying (O’Connor, 2005). This is also supported by (Harrop & Turpin, 2013) who found the majority of learners had food or drinks on their desks or tables while studying. This phenomenon is not only in catering environments, but also very common in learning centers and centrally provided PC labs (Harrop & Turpin, 2013).

Above all, With the understanding of the concept and importance of informal learning, the traits of Generation Y students as well as the importance of the foods and drinks in the learning environment, third places become potential candidates for informal learning to occur. However, that is not to say every third place is suitable for informal learning. Generation Y students generally have their own behaviors, attitudes, and preferences with choosing third places for informal learning. The case study Harrop and Turpin taken at Sheffield Hallam University revealed nine preference attributes in term of the relationship
between informal learning spaces and learners’ behaviors, attitudes and preference (Harrop & Turpin, 2013). The nine attributes are as follows.

1) Destination
Based on learners’ personal demand and preferences, learners tend to choose different space at different times for different activities.

2) Identity
Learners have the tendency to reconfigure their work areas, such as moving chairs, tables, and other equipment.

3) Conversations
The learning space needs to provide the support for students to talk, share ideas, discuss, and debate.

4) Communities
Social and learning related conversations need to be supported in shared learning spaces. Studying in shared learning space is also motivational for students.

5) Retreat
Many learners have the demand for quiet and silent space when working individually, however, a majority student prefer to work alongside colleagues and friends.

6) Timely
On demand access to spaces and their services are important factors to learners.

7) Human factors
The ergonomics of the learning spaces, such as table dimensions, lighting, outside views, and sound levels could have an influence on users’ impression and performance.

8) Resources
Having resources readily available within the space for use is important. Resources can be PCs, printers, large screens, internet, or a library.
9) Refreshment

Food and drinks make the space more attractive to learners, as well as help them to stay focused with study.

These nine preference attributes were concluded to offer valuable insights on the design of informal learning supported third places.

Summary

The review of literature extensively analyzed the pronounced characteristics of Generation Y, the most pronounce traits of information learning, how physical and behavioral environment affects people’s learning behavior, and successfully established a strong connection on how third places are the ideal places for informal learning activities to take place. Generation Y students are social and it is through the process of social disclosure, the conversing and socializing, that informal learning occurs. Third places at their best provide a different atmosphere and promote social activities. On the foundation of this logic, third places are naturally becoming the best place for informal learning to happen. However, it is not certain that current on-campus coffee shops fully support students’ dynamic informal learning styles. The next phase of this study is to systematically analyze two of the most popular on-campus coffee shops at Iowa State University. Through the analysis of these two spaces, this study is designed to find how students engage informal learning in these spaces, and how well or not well these spaces could support students informal learning activities. Ultimately, these findings will create an on-campus coffee shop that fully supports Generation Y students’ dynamic informal learning styles.
CHAPTER 3. METHODOLOGY

Introduction

Qualitative approach methods and quantitative approach methods were applied to this study to collect data. The interactions with participants through multiple opportunities ensures the complexity of the topic is investigated thoroughly. This investigation includes the following methods: casual observation, systematic observation, survey, and individual interview. Each method increases the depth of the data collected. Informal methods such as casual observation was used to compare students’ behaviors to the data collected from the survey. Statistical data on current usage, user preferences, satisfaction, trend, and ideal informal learning environment can be used as the foundation to redesign on-campus informal learning cafés. Due to the variety of methods engaged in this study and the variation of implementation from method to method, each method will be outline individually.

The selected investigation methods were chosen to primarily address the following investigation questions.

1. How does informal learning occur while students use the on-campus coffee shop? (Casual observation)

2. How do current university students choose on-campus coffee shops as informal learning spaces? (Survey)

3. What does user behaviors reveal about their informal learning styles and needs? (Systematic observation)

4. How can students’ perception of an informal learning space can be integrated into the design of an on-campus coffee shop to better support an informal learning environment? (Systematic Observation)
Casual Observation

Observation was useful as first step to set the foundation for investigation and methodology. Two casual observations were conducted for this study, first was at Fredericksen Court Community Center (FCCC), which is located in the center of a student residence hall. Its location is on the edge of the main campus. The second observation happened at the Hub, which is located at the center of the main campus. The two spaces observed offered a high degree of similarity in functionality and overall atmosphere. Besides the difference in their location, they are both used by students as informal learning spaces. With one space (the Hub) located at the center of campus and one (FCCC) on the edge. The duration of each observation session was approximately two hours. The observation results were used to unveil how students use the space for informal learning, current trends in usage, and how the interior space of the on-campus coffee shop can be designed to respond to student behaviors and preferences.

The purpose of these two observation sessions was to document the location and environmental characteristics of where students were engaging informal learning activities. Since the observation involved observing public behavior from within the café, it is important to disclose that the data collection process did not alter the behavior of the investigation targets. In order to do so, the primary method for collecting data during the observation session was taking field notes. No video or audio recording devices were used in this observation, the investigation targets were not engaged. Field notes during the observation sessions served to record the types of activities and types of space within the building that could inform future methods and overall behavioral trends.
Fredericksen Court Community Center

FCCC is located at the center of Fredericksen Court, which is considered an on-campus student residence hall. FCCC functions as a combination of a food hub and a market place. The majority of its users are students who live close by.

The casual observation took place at FCCC in Ames, Iowa on Sunday, April 25, 2017 between 2:00 pm to 4:00 pm. This date was around final exam time and many people would come and utilize this space to study. Figure 3 includes photographs of the space to provide an impression of the interior design, layout, and overall atmosphere.

Figure 3. Fredericksen Court Communication Center interior.
The Hub

The Hub is located at the center of the main campus of Iowa State University. It consists of a café, a food hub, and a large area for seating. Due to its unique location, the traffic volume of this space is relatively high, especially during the weekdays.

The casual observation took place at the Hub in Ames, Iowa on Monday, April 23, 2017 between 12:00 pm to 2:00 pm. Figure 4 includes photographs of the space to provide an impression of the interior design, layout, and overall atmosphere.

Figure 4. The Hub interior.
Over the course of two hours of casual observation, five different areas within each space were observed. Observation duration for each location range from 20 minutes (food hub and the market place) up to an hour (main seating locations). This enables the observer to observe café user behavior in various situations, from more public and crowded areas to more private and quiet zones. Behavior observed in the spaces that weren’t considered informal learning space, such as the market place and the food hub, also have revealed results on how they have affected users’ actions.

Survey

The purpose of the survey was to collect data on the usage, satisfaction level, and ideal informal learning environment of FCCC and the Hub from a sample of Iowa State University undergraduate students. The survey was distributed and collected on site after gaining permissions from the participants. Three survey sessions were performed in order to gain a wide range of user types.

An initial pilot study was engaged prior to sending out the survey in order to test out how long the survey took students to complete, and to identify questions that needed clarification and revision. According to the pilot study, the survey took 6-8 minutes to complete. Modifications and corrections were applied to the survey after the pilot study to achieve an accurate survey. A sample of 100 undergraduate students were randomly chosen to participate in the survey at each location. A request to participate in the survey occurred on site with each participant. Each participant completed the survey individually.

The on-campus coffee shop for informal learning survey (Appendix E) consisted of 34 questions. The survey breaks down four key segments; 1) demographic of the participants; 2) the overall impression of the space from participants; 3) detailed questions regarding interior elements related to ideal individual informal learning; 4) detailed questions regarding
interior elements related to ideal group informal learning. At the end of the survey, an open question was asked in order to obtain any uncovered aspect that can be potentially helpful for the ideal informal learning environment.

The purpose of the questions on ideal on-campus coffee shop for informal learning was to discover what students would find appealing to them in the interior design of the on-campus coffee shop. The elements identified by the students in their ideal informal learning space would be the most valuable and critical for the design of the on-campus coffee shop. Through the survey, a better picture of the ideal on-campus informal learning space can be obtained and lays a good foundation for systematic observation to point out how systematic observations should be carried out to further assist in the investigation of this study.

**Systematic Observation**

As an extension of the casual observation and survey, systematic observation focused on three major aspects: space zoning, environmental variables, and user interactions. By systematically observing users in on-campus coffee shop environments under these categories, a more detailed documentation of behaviors (in terms of informal learning activities and interactions with the environmental variables) can be established. The main goal of the systematic observation is to understand relationships between these three aspects in order for designers to make better decisions when designing space for informal learning.

A data collection system has been generated to record these three categories. First, the palette of place. In the literature review, the palette of place was described, which consists of four zones: private/alone, public/alone, private/together, and public/together (Steelcase Education, 2015). Based on the traits of palette of place, FCCC and the Hub were split into four zones. This is a fundamental aspect to understand the basics of the space. Before
engaging in the observation and identifying the environmental variables and user interactions, it is critical to identify the all four zones with in the cafés.

Second, within each zone, environmental variables, such as light level, sound level, crowdedness, seating types, were explored. There was potential that certain user interactions are result of the certain environmental factors. The impact could either be positive or negative, but the environment variables were a way of systematically organizing these behavior patterns. Table 1 displays a complete list of environmental variables for the systematic observation.

Table 3. Environmental Variables.

<table>
<thead>
<tr>
<th>Environmental Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Level</td>
</tr>
<tr>
<td>Noise level</td>
</tr>
<tr>
<td>Acoustic Privacy Level</td>
</tr>
<tr>
<td>Visual Privacy Level</td>
</tr>
<tr>
<td>Crowdedness</td>
</tr>
</tbody>
</table>

Third, during the systematic observation, user actions were recorded and grouped into serval categories, for instance, dining, eating, and having drinks were categorized under food and drink; any actions engaged with a computer were categorized as computer usage.

Categorized user interactions were used to identify the major behaviors of the students and their relationship with the user environment. If certain relationships can be established, it can be very helpful for designer’s decision when determining the functionality, as well as the atmosphere of the space. Figure 6 provides a complete list of the user interactions group.
Table 4. User interactions that has close relationship to informal learning.

<table>
<thead>
<tr>
<th>User Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Drink</td>
</tr>
<tr>
<td>Computer Usage</td>
</tr>
<tr>
<td>Power Outlet</td>
</tr>
<tr>
<td>Study Tools</td>
</tr>
<tr>
<td>View Nature</td>
</tr>
<tr>
<td>Working Space Adjustment</td>
</tr>
<tr>
<td>Seating Comfort</td>
</tr>
<tr>
<td>Personal Belonging Storage</td>
</tr>
<tr>
<td>Seating Options</td>
</tr>
<tr>
<td>Books and Notes</td>
</tr>
</tbody>
</table>

The systematic observations were executed within FCCC and the Hub. After collecting and organizing the data, comparisons of different zones within the same café was engaged. Data gathered from systematic observation can be found in the (Appendix B).

**Fredericksen Court Community Center**

The systematic observation sessions took place at FCCC in Ames, Iowa on Monday, March 26, 2018 between 2:00 pm to 6:00 pm. This is a period where students are done with their classes and begin to accumulate within the café space. Figure 7 includes a floor plan of the space to provide the specific layout of the space and furniture arrangement and provides the four different zones.
Figure 5. The floor plan of Fredericksen Court Community Center.

The Hub

Observation sessions at the hub took place on March 27, 2018 between 10:00 am to 2:00pm in Ames, Iowa. Many students pass through the Hub to take a break, study, and have lunch. During this observation period, all these activities were observed, which gives a full picture of what the space is like and how the space functions. Figure 5 includes floor plan of the space to provide the specific layout of the place and furniture arrangement and provides the four zones.
Figure 6. The floor plan of the Hub.

For both observation sessions, each session is based on the four zones. Five observation subjects were chosen for each zone. Observation duration for each subject was approximately 20 minutes. During the 20 minutes of observation, the majority of their actions were noted and checked by using the user actions table in table 2. The observation was to record the actions of the subjects and how many times the actions had occurred through the course of the observation. Any actions that falls out of the existing action categories, additional notes were made. No recording devices were used for this portion of the study. A check list was used for each participant. None of the observation subjects were informed that they were being observed to maintain the legitimacy of this study. Depending on which zone was being observed the observer was often seated at a desk close to the subject from start to finish.
The check list prepared for the observation session was broken down to four parts. The first part was the floor plan of the entire space, which was used to record the seating locations of the subjects. The plan also contained the exact furniture layout of the space, so the seating type subjects used was also being recorded. The second part involved the palette of place which was used to identify the zones the subjects were seated in. Environmental variables were the third element on the check list used to identify the most interesting physical characteristics of the designated zone. Each environmental variable was rated on a 1-5 scale and were used to compare the physical differences among all zones. The last element was the user action list, which measured the frequency of behaviors that are related to informal learning. The action categories included: food and drink, computer usage, power outlet usage, study tools, view nature, working space adjustment, seating comfort, personal belonging storage, seating options, and books and notes. The majority of the user action fell into these categories and if the subjects had any actions that fell out of these categories, additional notes were made. A check mark was made for each time one of these actions was observed and recorded. These behaviors relating to informal learning could be compared against frequency in a different study zone to get conclusion about design applications that could potentially encourage or discourage certain user behaviors.

The systematic observation was designed to investigate how users respond to different types of environments. It was not necessary that users were totally aware everything in the environment, because actions are the most natural responses to how they feel about the physical space. The systematic observation provides an opportunity to record the behavior of the users from a third-person perspective. The observation result can be paired with data extracted from the survey in order to compare and contrast these two ends of the spectrum.
CHAPTER 4. RESULTS AND ANALYSIS

OVERVIEW

The initial observation and the survey data allowed the systematic observation to be more focused. Along with the observation and survey, the results found the in the systematic observations helped to shape the framework for designing on-campus coffee shops for informal learning.

Upon completion of the data collection and analysis of the four zones in two separate cafés, certain patterns began to surface. Some results and patterns were close to what was anticipated, however, some were not. The following is a discussion of what was revealed through the data in terms physical environmental variables and user behaviors. This investigation method was quantitative; therefore, numbers were used for comparison among zones and space.

FCCC

Overview

Looking at the overall data recorded and analyzed from the systematic observation. Data revealed that certain user action categories shared high levels of similarity. The overview of the observation session at FCCC is fairly consistent across the four zones within the café.

Food and Drink

Food and drink stayed fairly consistent throughout all observations in all four zones. Not all observation subjects had food with them; however, everyone had a drink, whether it was a water bottle brought themselves or a drink purchase from the café. Though not everyone had food during the observation period, the actions related to the food and drink
action stayed consistent throughout private/alone, public/alone, private/together, and public/together. The observation data highly coincides with the survey data. During the survey, students were asked the question about their favorite physical aspect. One question on the survey was, ‘Which following physical aspect do you like the most within the space?’ Aside from the physical location of FCCC, 89.4% of the survey respondents chose the availability of food and drinks. For group study, survey result shows an even higher percentage, a total of 92.1% of the survey respondents chose the availability of food and drink as their favorite aspect of the environment.

In this case, the observation data highly coincides with the users’ own perception of the spaces. It is fair to say food and drinks play an important role during the informal learning. People may not absolutely need food and drinks to engage in informal learning; however, food and drinks may assist the student to differentiate themselves from a formal learning environment.

**Computer Usage**

Another user action that maintains on the higher end of the spectrum is computer usage. In term of action counts of the computer usage, observation data accumulated within all groups differentiate from one another slightly. However, computer usage appears to be very frequent during the period of observation of all four zones. Almost every one of the observation subjects had a computer open on their table top. Aside from eating and drinking activities, using the computer was the major activity during the observation period. Observation subjects were reading and watching from the screen and typing on the keyboard. Sometime during group work session in the private/together area or public/together area, screens were often shared with others. Computers have become one of the major tools for informal learning, as they appear to be a dynamic device themselves.
**Personal Belongings**

The observation session was engaged during the winter. When students usually have heavier clothes on. Whenever they decide to stay in the café for an extend period of time, their clothing and backpacks are usually placed on the adjacent chair or table. This action is fairly consistent throughout the space. Through the observations of all four zones, users’ personal belongings take up certain table or chair space. This situation is slightly different for private/together and public/together areas. The seating type within the FCCC is mostly tables with four chairs, when the number of people within a group was more than three, students often end up placing some of their belongings on the floor. Personal belongings would intrude into the major circulation, people would have to adjust the location of their personal items from time to time. The findings may potentially reveal the need that users may need storage solutions in order to make the overall space more functional and improve their personal informal learning environment.

**Private/Alone vs Public/Alone**

Palette of place and environmental variables are discussed together as they are closely tied together. This section discuss how does the physical environmental factors differ from one zone to the other.

**Environmental variables**

Both private/alone and public/alone areas offered the same type of seating, regular height tables with four seats across from each other. According to casual observation, public/alone area was located on the far east side of the café against a large window wall. Due to the window wall, the light level in this area is higher than the private/alone area, and the overall visual privacy level was lower due to the students were exposed from both the interior side as well as the exterior side. A result from the observation was that the
private/alone area was located close to the public/together zone, which made the area noisier and more crowded than the public/alone area. Due to FCCC’s main seating area was a large open space with no physical separations, the acoustic privacy level of the two zones stay fairly consistent.

**User Interactions**

**Power outlets**

Surprisingly, the need for power outlet among the users in these two zones doesn’t seem to be as important as anticipated. From the private/alone zone, two of the five observation subjects used a power outlet to charge a computer. No one used the outlet or looked for an outlet during the observation period in the public/alone zone. The observation data shows similar results from the survey data. During the survey, students were asked a question about the satisfaction towards access to electric power outlets. From all the survey respondents, 52.1% responded with an answer of satisfied and very satisfied and 26.3% of the respondents remain neutral. The data points to the potential result that users could always locate a power outlet when need and/or users may not need to utilize the power outlet when using a computer. Another survey question asked respondents to estimate the average duration of their stay and 42.1% of the respondents answered with 1-2 hours. When students’ duration of stay is within two hours, the devices they are using may last the entire duration without the need to plug into an external power outlet.

**Study tools**

FCCC offers four computer stations and two printers for students to use. During the period of systematic observation, minor use of this area was recorded. For both private/alone users and public/alone users, neither group of students utilized the study tool provided by the café frequently. Providing study tools, such as computers and printers within the space can be
helpful when needed; however, as previously discussed, students major study tools are personal computers and the provided study tools may not get used as frequent as anticipated.

**View nature**

The color palette of the space was rather neutral, no use of bright colors was found in the space. Additional to the lack of colors within the space, there was no interesting design features or interior visual interests in the space either. The private/alone zone was against a wall with minimal openings and the public/alone zone was located adjacent to the window wall which gave a view to the exterior space.

From the data collected from the systematic observation. Observation subjects in the public/alone zone had a much higher frequency of looking outside of the window than private/alone users. Observation subjects from both zones would rarely look at the interior elements as there was a lack of design or visual interest elements.

**Furniture comfort**

Overall, observation subjects weren’t very satisfied with the level comfort of the furniture provided in both zones. As previously mentioned from the casual observation, the seating type and furniture type are identical in both zones. During the observation, the subjects from both zones were constantly adjusting the chair, as well adjusting their posture. During the survey, students were asked a question about their least favorite physical aspect and 36.8% of the survey respondents selected furniture type, which is the highest of all the options provided. In the casual observation, the furniture provided in these two areas are standard height tables and chairs. The tables did not offer any adjustable features nor did the chairs. The chairs were also missing upholstery and any type of adjustability. From these three perspectives, the result is the space does not provide a comfortable seating option that supports informal learning.
**Workspace adjustments**

It is important to note that within the private/alone zone, an individual often study by themselves using the entire table and an individual who seats in the public/alone area may do individual work but can be seating together with one or more people. The observation result shows a dramatic difference between public/alone and individual/alone areas. Workspace adjustments were far less frequent in the private/alone area than in the public/alone area. During the observation session, all observation subjects adjusted their workspace area to a certain degree (i.e., move computer away, reposition the note book, etc.); however, in the public/alone area, the workspace adjustments were more frequent. Additionally, whenever the observation subject in a public/alone area rearranged the work space, it often triggered the people who were seated at the same desk to do the same. However, the main cause for high frequency workspace adjustment could potentially be that there is less personal space in the public/alone area.

**Books and notes**

In addition to the use of computers, reading books and taking notes are two major actions of informal learning. However, when compared to computer usage, the frequency of using a book or taking notes is much lower. Private/alone and public/alone differentiate from one another dramatically. Public/alone user observation reports a much lower frequency of using book and taking notes than private/along users. This may be affected by the smaller workspace as the tables are sometimes shared with other users. Along with the workspace adjustment, having enough space could be another factor that potentially affects the users’ informal learning experience.
Seating options

When users are provided with the options to change, they will change to accommodate their needs or adapt to the environment. There are a few actions recorded during the systematic observation session where people changed their seats or locations. The reasons behind these actions have also been recorded in the observation notes. One observation (private/alone) subject needed an outlet, so he moved to the seat closer to the wall. Another user (public/alone) changed to a new location due to the sun glare. This action does not necessarily associate with the certain space directly, but with other environmental factors, such as light level and locations of the power outlets.

Private/Alone vs Private/Together

Environmental variables

In terms of physical environmental variables, private/alone area and private/together areas were very similar to one another. Both private/alone and private/together offer the same type of seating, as they were regular height tables with four seats across from each other. Both areas were located against walls with minimal openings, which provided both areas the same degree of visual privacy. There were two sets of tables from each zone located close to an opening, which provided the tables a view to the outside, as well as a slight increase in light level. Both areas were located against public/together area, which made the space somewhat crowded due to higher traffic. Due to FCCC’s main seating area was a big open space with no physical separations, the noise level and the acoustic privacy level of two zones were fairly consistent. Because the space was so similar to each other from the perspective of physical environment, how these spaces were differentiated from one another was mainly dependent on users’ perception of the space. During the observation session,
more single study individuals were found in the private/alone area and more group work
individuals were spotted in the private/together area.

**User interactions**

**Power outlets**

As previously discussed, there appeared to be less demand for electrical power outlets
for individuals in the private/alone area; however, things were dramatically different in the
private/together area. Per observation notes, during all private/together observation sessions,
the power outlet was constantly being used and often people would take turns to use the same
power outlet to charge their laptops or phones. This scenario was reflected in the survey data
as well. During the survey, for group study, students were asked the question about the
satisfaction towards access to an electric power outlet. Of the survey respondents, 55.6%
responded with an answer of dissatisfied and very dissatisfied. And 28.2% of the respondents
remain neutral.

**Study tools**

As previously stated, FCCC offers four computer stations and two printers for
students to use. During the period of systematic observation, the use of study tools was
higher in the private/together area then the private/alone area. During group work, they may
often find have the need to print study material or finished project or just grab a blank paper
from the printer to take notes. Students’ major study tools are their computers and by
observing these two groups revealed that the study tools offered by the space are utilized
more often by group study users. These results could mean: 1) having a study tool within the
on-campus coffee shop could be useful and beneficial to the users; 2) the location of these
study tools could be located adjacent to the group study area for easier access.
**View nature**

As both private/alone zone and private/together zones are located against walls with minimal openings. Additionally, there was a lack of interior visual interests and design elements. There wasn’t much “view nature” action being recorded for either zone. The overall observation for this particular action (view nature) was on the lower end of the spectrum.

**Furniture comfort**

Overall, observation subjects weren’t satisfied with the comfort level of the furniture provided in both zones. In the casual observation, the seating type and furniture type are identical in both zones. During the observation, the subjects from both zones were constantly adjusting chairs, as well as adjusting posture and occasionally adjusting the location of the table. During the survey, for individual study, students were asked their least favorite physical aspect of the space and 36.8% of respondents selected furniture type, which is the highest of all the options provided. For the same question in group study, 33.3% of respondents selected furniture type, which is the second highest of all the choices given. The highest least-liked physical aspect in the space was furniture type. The furniture provided in these two areas were standard height table and chairs. The table did not offer any adjustable features. Also, the chairs were missing upholstery and any type of adjustability. From these three perspectives, the space did not provide a comfortable seating option that supported informal learning.

If the students were utilizing the café for long-duration informal learning sessions, the space should provide seating options that support such activity. This is not to say the all the dining tables and chairs must have full height adjustability (which might not fit the overall
design of the café) but the space needed to provide an option or several furniture types that
would ergonomically accommodate most people for comfortable long-term seating.

**Workspace adjustments**

Individuals often sit by themselves claiming the entire table during their stay.
Students who sit with a group of two or more needed to share the table with others. In the
zone of private/alone, work adjustments were less frequent than in the private/together area.
During the observation session, all observation subjects in private/alone area would adjust
their workspace areas to a certain degree (i.e., move computer away, repositioned the note
book, etc.). When to a table was shared by two or more people, each person only had access
to a portion of the table. Combining the fact that they would have their laptop out on the
table, there is almost no space left for other study materials, such as notebook, books, food,
and drinks. Observation showed students shifting things around and rearranging their work
space more frequently than the users in private/alone area.

The observation data revealed that all café users were treated equally by offering the
same types of furniture type throughout the entire space. However, furniture was often times
not used in a way that reached its full potential or did not fully support all users’ activities.

**Books and notes**

When comparing reading books and taking notes, the frequency of these actions was
much lower than computer usage. Private/together users’ book and notes related action is
much lower than private/alone. This may be due to the small table real-estate with a shared
table top with other users. Because of the smaller table space they were less able to take notes
or read books in a comfortable way and may have opted for taking notes on a computer,
which could have driven the actions related to computer usage high.
**Seating options**

There were a few actions being recorded during the systematic observation session where people changed their seats or locations. But only for the single, individual users in the private/alone area. The reasons behind these actions have also been recorded in the observation notes. In one observation (private/alone) the subject needed an outlet, so he moved to the seat closer to the wall. However, no seat changed was being observed for the private/together group. The reason for this location change may be: 1) all the other seating types are identical to theirs, if moved they are not necessarily gaining any benefits; 2) during the time frame of the observation session, the space is rather full and options were limited.

**Private/Alone vs Public/Together**

**Environmental variables**

In term of physical layout, function, and locations, the private/alone zone and public/together zone was very different from each other. The public/together zone was scattered around the fireplace, which was located at the center of the main dining zone. The public/together offered a total of four types of seating. Public/together consisted of regular height tables with four seats on each side of the table. The second and the third type fell into the same category as they were single-seat or multi-seat couches. They were being grouped in two groups and separated by the fireplace. The fourth seating type was a small round bar height-table with two bar-height stools and there was a total of two sets of this type of seating. The seating type in the private/alone zone was very limited when compared to the public/together zone. As previously stated, the private/alone zone also had regular height table with four seats across from each other. The public/together area was located among the main circulation of the open seating space. Though the private/alone zone was right next to public/together zone, the private/alone had a wall with a minimal opening next to it, where
the public/together zone was a large open space. The physical locations of these two spaces made the private/alone zone more visually private than the public/together zone. Due to FCCC’s main seating area being a big open space with no physical separations, the public/together zone was also located among the main circulation of the dining area. The noise level and the acoustic privacy level of the public/together was lower than the private/alone zone. During the observation session, (as both spaces are mainly lit by the interior artificial light) the light level of these two spaces were fairly identical.

**User interactions**

**Power outlets**

The observation shows there weren’t many power outlet usage in the private/alone area. The situation was different in the public/together zone, as the entire public/together zone was floating in the center of the major dining area. There was no power outlet provided in this area. Therefore, the usage of the power outlet in public/together was zero.

**Study tools**

The results were similar to the comparison between private/alone and private/together. The four computer stations and the two printers offered by the FCCC was used more often by the public/together users than the private/alone users. Students could use computers as their main tool of informal learning; however, during group work, they might often find themselves needing to print out additional material. The computer/print station offered that functionality. It was convenient for students when such functionality was offered to make the space more functional and dynamic.

**View nature**

The public/together zone was located around the fireplace in the center of the dining area. Observation subjects in this zone only had access to the exterior view from a distance.
Therefore, the frequency of subjects looking outside the window or finding visual interests within the interior environment was quite low in these two zones.

**Furniture comfort**

Due to the multiple seating types in the public/together area, the observation sessions engaged at the public/together zone also covered different types of seating. The data extracted from the public/together zone observation session reflects the overall satisfaction of all the seating types combined. Holistically, the public/together users had a higher satisfaction level in terms of furniture comfort than the private/alone users. The seating types had overlap in the two zones; however, the public/together zone offered more seating types. The additional four types of the seating may offer students higher level of comfort based on the seating type. However, the overall frequency of people adjusting their posture and occasionally adjusting the location of the table was still high. In conclusion, observation subjects weren’t happy with the comfort level provide by the furniture in both zones. The survey data also reflects this result. During the survey, for individual study, students were asked the question about their least favorite physical aspect and 36.8% selected furniture type, which was the highest of all the options provided. For the same question in group study, 33.3% of the survey respondents selected furniture type, which was the second highest of all the choice given. The most chosen least-liked physical aspect in the space was furniture type. The public/together zone offered a somewhat higher level of furniture comfort and may be the result of offering different seating option within this zone.

More seating types could increase the furniture comfort level as the users have choices in seating which may suite them better to support their informal learning.
**Workspace adjustments**

The results for work pace adjustment was similar to the comparison between private/alone and private/together. In the zone of private/alone, work adjustments were less frequent than in the public/together area. The adjustment frequency was lower in the private/alone zone than the public/together zone. Due to the table sharing by two or more people, each person only had access to a small portion of the table. When things needed to be shifted, it sometimes required others to move their belongings or study tools. Offering the same furniture showed not to be a universal solution to all learning styles. When group work is being conducted, a bigger table top may be needed in order for the group to collaborate more efficiently and smaller table tops could offer individuals an option in order to save space.

**Book and notes**

The result was somewhat similar with the comparison between private/alone and private/together. The frequency of the note-taking or book reading action was less in the public/together zone than the private/alone zone. This finding may emphasize the result found in the workspace adjustment section, where providing the right amount of table top surface can be helpful for students’ informal learning experience.

**Seating options**

During the observation session for both zones, the actions of seat changing and location changing was recorded for both areas. For individual users in the private/alone area, people changed seats due to the need of an outlet or to sit closer to a window. The motive behind these actions in the public/together area was different in certain scenarios. There was one group of two moved from group sofa seating to a regular height table setting, during the observation session. The main activity while at the group sofa setting was dining and having
a conversation; however, when they finished eating and were ready to switch to studying, they switched to a different seating type.

The observation session revealed the potential benefits of more seating types within the space. Users would have the option to choose the suitable seating for their activities. To a certain extent, these seating options can support all the user activities; however, grouped sofa and coffee table settings maybe a better option for dining and regular table height seating would be used for individual or group studying.

**Public/alone vs Private/together**

**Environmental variables**

Both public/alone and private/together zones offer the same types of seating, which are regular height table with four seats across from each other. Public/alone zones were located against a wall with many window openings. Private/together zones were located at a wall with minimal openings. Naturally, the light level in the public/alone area was higher than the private/together area. FCCC’s main seating area was a large open space with no physical separation, the noise level in these two spaces was relatively similar. Public/alone zone seats were at one end of the café circulation and private/together was located on one side of the main circulation. Therefore, acoustic privacy and crowdedness level of the private/together zone was lower than the private/alone area. From a visual privacy standpoint, the private/together zone had a solid wall with minimal openings that provided some level of visual privacy. The visual privacy level of the private/together zone was higher than the public/alone zone, which was exposed to the exterior and interior.
**User interactions**

**Power outlets**

The demand for electrical power outlet varied between the two zones. The usage of electrical power outlet for both zones had been discussed in the previous comparisons. At the time of observation, no one was utilizing the power outlet in the public/alone zone, however, the in the private/together zone, the power outlets were being used and often people will take turns using it. According to the data collect from the survey, for individual study, the majority of the users were satisfied with the power outlet situation in the dining area FCCC; however, more than half of the users were dissatisfied with the power outlet situation for group work.

From the study tool observation section, it was easy to conclude that the main tool students used for informal learning was their computer. Power outlets would enable students to keep working on their projects, assignments, or other activities without worrying about the battery level. With the data from the survey, it was clear that students needed power outlets when they were studying in the café. There was a tendency for individual working users’ demand for power outlets were less than the group working users.

**Study tools**

During the period of systematic observation, use of the computer station and printers was recorded as low for the public/alone users. However, private/together users had higher tendencies to use the study tools provided by the space. This was similar to the other alone vs together comparisons. Alone users are less likely to utilized the study tools, while group work users may utilize the study tools at a high frequency.

This additional comparison reaffirmed the comparison discussed in the previous chapter. Having a study tool within the on-campus coffee shop is useful and beneficial to the
users; and the location of these study tools can be strategically located closer to the group working area.

*View nature*

The comparison was similar to private/alone and public/alone, since public/alone sits against the window wall. Observation subjects in this zone had a higher frequency of looking through the window into the outside environment. The frequency of this particular action was much lower in private/together zone.

*Furniture comfort*

The dining space used the same type of furniture throughout both public/alone and private/together. This one-size-fits all approach wasn’t well received by users. Overall, users weren’t satisfied with the level of comfort of the furniture provided in both zones and the survey data coincided with the observation as well. During the survey, for both individual and group work, students were asked about their least favorite physical aspect and top choice was furniture type. The standard height table did not support students informal learning at its full potential and was an area for improvement.

*Workspace adjustments*

The public/alone and private/together comparison was similar with the private/alone vs private/together. In the public/alone zone, students may be working individually; however, there are situations where two or more people were seated at the same desk. This shows that, unlike the private/alone zone, the table was actually shared with multiple people. In some public/alone observations, users would sit alone at the table and had the entire table top. In other cases, two or more people shared one table top. For both public/alone and private/together, when table tops were shared, each person’s workable surface shrinks. This
was shown to lead to more frequent work space adjustments. The overall work space adjustment of the private/together zone was higher than the public/alone zone.

**Books and notes**

The frequency of reading books and taking notes was low when compared to computer usage. The observation data revealed that the frequency of book reading and note taking was relatively low. Students may be using electronic information rather than in book form. Additionally, the table top area shrank noticeably when there were books or note books out which made the space even more crowded when a computer was present.

**Seating options**

No changing of seats or location was recorded during the observation session in private/together area. This could be due to the following: 1) during that time of day, the space is fairly crowded, with little seating options for a group of two people or more; 2) the seating options offered in the private/together zone was identical to each from all the environmental variables which provides no reason to change. For the public/alone zone, an observation subject changed seating to avoid sun glare. Due to the fact that the public/alone zone is located by the window, glare could be a potential issue during certain times of the day. The windows by the public/alone zone did not provide any kind of shade and poses difficulties for students when the glare is present.

**Public/Alone vs Public/Together**

**Environmental variables**

The public/alone area differs from the public/together zones in several ways. The public alone and public/together zones were located next to each other. The public/together zone was scattered around the fireplace located at the center of the main dining zone. The public/alone area was located on the east end of the café, which was also the end of the main
circulation path. The public/together zone offered four types of seating, mainly regular height tables with four seats on each side of the table. The public/together zone also contains single or multi-seat couches grouped in two groups and separated by the fireplace and two sets of small, round bar-height tables with two stools. The private/alone only had the regular height table with four seats across from each other. The public/together was mainly lit by artificial lighting, while the public/alone zone had natural light in addition to artificial lighting; therefore, the light level in the public/alone zone was higher than the lighting in the public/together zone. The public/alone zone was located at the end of the circulation where the windows that line it provide a view from the exterior and lowered visual privacy. The visual privacy level of the two zones were relatively the same. In term of crowdedness and noise levels, the public/together zone was higher than the public/alone zone, due to the fact the public/together zone was surrounded by the circulation.

**User Interactions**

**Power Outlets**

Due to the location of the public/together zone, in the center of the main dining area, and there were no power outlets provided. For the public/alone zone few people used the electrical power outlet. For the public/alone zone, the demand wasn’t as high as expected. It was difficult to conclude the power outlet usage situation in the public/together zone, as users may have an actual demand, however, the power outlets were not provided. This portion of the study could use observation data gathered in the private/together zone as a reference for the power outlet demand in public/together zone. The demand for power outlets for group activities was high. If the assumption was correct, this comparison provides useful insight for this study. Power outlets are definite tools that students utilize for their informal learning
activities. However, in this scenario, power outlets aren’t provided in certain area, which means the space did not fully support students informal learning activity in this area.

**Study tools**

The computer stations and printers were often utilized by the public/together user rather than the public/alone users. Little usage of the study tool provided by the FCCC was from the public/alone user. This piece of information would help future designers to locate the study tools to maximize their potential.

**View nature**

Given the locations of these two zones, one was close the window wall and one was at the center of the interior. The observation data shows that the public/alone zone users had a higher frequency of looking outside of the window. Within the public/together zone, the space only had access to the outside view from a distance, which made the frequency of this action lower than the public/alone zone.

**Furniture comfort**

The public/together zone offered a variety of seating types, the observation session engaged at the public/together zone also revealed different types of seating. The overall satisfaction level of the furniture comfort in the public/together zone was average for all seating types. The public/together zone offered different types of seating and the overall satisfaction level of the public/together zone was higher than the public/alone zone. The public/together zone offered four types of seating for students to choose from based on their activities. However, the overall frequency of people adjusting their posture and occasionally adjusting the location of the table was still high. During the survey, when students were asked their least favorite physical aspect, furniture type ranked the highest for both group
work and individual work. More seating types may help with the overall satisfaction level of the furniture comfort as users have the options to support their informal learning activities.

**Workspace adjustments**

The comparison of the workspace adjustment between public/alone and public/together zones can use the public/alone vs private/together as a reference. In terms of workspace adjustment, the public/alone and public/together were very similar. In the public/alone zone, students may be seated together and sharing the same table but work individually. When table top real estate shrinks, people tend to adjusting their limited table top layout to accommodate all their belongings. However, the overall data show the workspace adjustment frequency in the public/together zone was still higher than the public/alone zone. This may be due to the fact that not all tables were shared by multiple people in the public/alone area, there are scenarios where a single user took up the entire table during the observation session.

**Books and notes**

Similar to other comparisons, the frequency of book usages and note taking actions were lower than computer usage. There are a few factors that may contribute to this result. First, computers are the main tool used for informal learning and many of the materials are in electronic form. Second, in these two zones, table tops are often shared with others, therefore books and notes were eliminated due to small space to work with.

**Seating options**

For the public/alone area, a few observation subjects have changed their seats during the observation session. One public/alone user changed to a new location due to the sun glare. The public/alone area was located by the large window opening which created opportunity for sun glare. However, the window did not provide shades of any kind. Students
had no choice but to move in order to continue their study. For the public/together area, there was one group of two that moved from a group sofa to a regular height table set, during the observation session. The main activity while at the group sofa set was dinning and having a conversation; however, when they finished eating and were ready to switch gears to studying, they switched to a different seating type.

There are a few reasons why students may change their seats or location. First, something that interrupted their on-going activity, such as sun glare. Students would often adjust their location to eliminate the problem. Second, a change in major activities could spur a change. Grouped sofa seating may be more suited for dining, but when users finished eating and switch their major activity to studying, there is a good chance they will change their seating options.

**Public/together vs Private/Together**

**Environmental variables**

The public/together zone and private/together zone was located next to each other; therefore, these two zones shared similar conditions in terms of environmental variables. Both of these spaces were mainly lit by artificial lighting, the lighting level in these two zones were fairly consistent at a moderate level. The same applied to the noise level and acoustic privacy level. Both spaces are open and have the main circulation path run through them. The noise level is moderate in both zones and due to the openness of the overall space, and the two zones are located on the two sides of the main circulation path, the rating for acoustic privacy level was rather poor. The private/together zone sat against a solid wall with minimal opening, and public/together was floating in the center of the main dining space. Visual privacy level for private/together is somewhat better than the public/together zone; however, both zones get fairly poor ratings on the visual privacy level. Lastly,
crowdedness, both spaces had the main circulation path running through them. However, the public/together had multiple circulation paths running through it. For crowdedness, both zones were fairly crowded however private/together was in a slightly better situation.

**User interactions**

**Power outlets**

As previously discussed, due to the location of the public/together zone, there aren’t any electrical power outlets located close to the zone. Therefore, the power outlet usage in this area was none. The private/together is on the complete opposite side of the spectrum, during all the private/together observation sessions, the power outlets nearby are always occupied. In certain scenarios, people would take turns to use the power outlets to make sure their devices stay powered on.

From the physical environmental variables, these two zones may have certain differences. However, in terms of functionality both public/together and private/together zones were mainly used for group work. During the observation sessions for the private/together zone, the demand for power outlets was high. Since the public/together zone was geared towards group work as well, there was a high potential that the demand for power outlet in public/together zone was also high. Unfortunately, due to physical limitations, the power outlet was not available in this area. During the survey, more than half of the survey respondents were dissatisfied with the power outlet situation within the FCCC, which indirectly reflected the demand for power outlet in public/together area.

**Study tools**

During the observation sessions for both zones, the utilization rate for the computer station and printers provided by the FCCC was similar to each other. The use of the study tools provided by the café in these two zones were discussed separately in previous
comparisons. However, it is still surprising to see similar results when comparing the two spaces that are mainly used for group work. This comparison provided meaningful insights for designers when trying to make decisions on including study tools within the café space.

**View nature**

As both zones did not have much visual access to the exterior environment. The interior of this space did not feature design elements and visual interior. As expected, the frequency of “view nature” was on the lower end of the spectrum.

**Furniture comfort**

The result of the furniture comfort comparison between public/together and private/together was very similar to the comparison between private/alone and public/together. The furniture provided in the private/together zone was identical to the private/alone zone. The overall frequency of people adjusting their posture, the position of the chair, or the position of the table in the private public/together zone was high. The public/together zone may have offered lower frequency due to the multiple types of seating offered; however, the overall chair shifts, table shifts, and posture changes was still on the higher end of the spectrum. People weren’t very satisfied with the comfort level with the furniture provided with in the space.

**Workspace adjustments**

Both public/together zone and private/together zone, tables are shared by two or more users. In this scenario, the table top space each person has, was shrinking. Users often find this difficult to have all of their study tools laid out on the table top and things need to be shifted around more often to make the work area more comfortable or to accommodate others. In this case, both zones exhibit a high frequency of the workspace adjustment. Workspace adjustment is an aspect to tell how satisfied people are with the workspace
situation. Users may not be very satisfied with the situation if things needed to shift more than needed.

**Books and notes**

For both zones, the activities of book reading and note taking were negligible. They are both on the lower end of the spectrum. This finding may emphasize the result found in the workspace adjustment section. Due to limited tabletop space, users may have to adapt to the physical constraints and eliminate certain activities which is not conducive to support students’ informal learning activities.

**Seating options**

In the private/together zone, there is only one seating type provided, and the environmental variables stays fairly consistent. Users would have similar experience no matter where they choose to sit. During all the observation sessions, no group switched for a different seat. The results from the public/together observation sessions had different results. Public/together offered a total of four types of seating. People may utilize one type of seating for certain activity and change seats when the major activity changes. As mentioned in the previous discussion, there was one group of two that moved from group sofa seating to a regular height table set, during one of the public/together observation sessions. A main reason behind this move was there was a major shift in activities. While at the grouped sofa, they are dining and talking. After eating, they switch the main activity from eating to studying, and moved to a different type of seating that could accommodate their study activity better.
FCCC Summary

Through the comparisons among all four zones within the FCCC, the results of the comparisons not only highlighted certain aspects that positively contribute to the users’ informal learning experience, but also revealed problems.

First, environmental variables, as previously mentioned, based on the casual observations, and how people generally use the space, the main dining space was being categorized into four zones. However, during the comparisons of all four zones, environmental variables did not align with the functionalities or the atmosphere of the zones. For instance, private/alone zone is often found more crowded than public/alone; however, it does offer more visual privacy than the public/alone zone; public/alone zone is the least crowded among all four groups due to its physical location. Similar conflicts exist in other spaces as well. In this regard, users’ behavior tells you what this area was most suited for; however, the environmental variables of this area often don’t coincide with the characteristic of this zone. In other words, there aren’t clear lines among all four zones, therefore users’ informal learning activities may not fully support by these zones due to the missing/mismatching environmental factors.

By looking at the overall data record and comparisons. Some user actions were similar and consistent, such as food and drink, computer usage, and storage for personal belongings. Food and drinks can be always found during all the observation session, food and drink may not be the absolute necessary element for informal learning, but food and drink can function as an element with the space that make the space more informal, and users can better differentiate themselves from a formal learning environment. Computer usage is extremely high, almost all users have a computer open on their desk, computers have become the main tools for their informal learning activities. In order to support students’ informal
learning activities, to some degree, also means to keep these devices running, which lead to electrical power outlet usage, which will be discussed later in the chapter. Lastly, personal belongings, the problem observation data has revealed is that there was no dedicated storage area for users to store their personal belonging. This situation became somewhat problematic when people start to put their belongings on the floor and become obstructions in the main café circulation. An area that could compensate for users’ personal belonging would make the space more functional and improve people’s informal learning experiences.

There were also user actions that were dramatically different from one zone to another. First, power outlet usage; the utilization rate of the electrical power outlet in the “together” zones were much higher than the “alone” zones. It could be beneficial to strategically place more power outlets in the public/together and private/together zones. Second, the study tools offered by the FCCC did see some use, but not a great deal and usage was mainly from the users who sat in the “together” zones. If the designers wished to include study tools within the space, the results from this study suggest to place the study tools adjacent to the public/together and private/together zones. Third, the comfortable level can directly affect students’ informal learning experience. Unfortunately, the satisfaction of the furniture comfort was on the lower end. The public/together zone, the main dining area of the café, offered only one seating type. Additionally, this seating type did not have any soft upholstery or any adjustability. The lack of different types of furniture could make a negative impact on students learning activities. Work surface adjustment was another important user action which unveiled how well the space was supporting students’ informal learning activities. The results were mixed, as the majority of the seating options in the FCCC could support a maximum of four people. When the table was occupied by one user, he or she
could comfortably layout all their study material. However, if a table for four was occupied by one single person it may seem like a waste of space. When there were two to four users seated around the table, the table top got crowded and the things on the table needed to be shifted more often due to less available table top space. The data extract from the work surface comparisons show the importance of the workable surface area. The space’s furniture selection attempted to have a one-size-fits all solution; however, not only were users not satisfied with the furniture type, but the one-size table top seemed problematic. Book reading and note taking are another important aspect of informal learning activity; however, given the fact that computers were main tools for informal learning, the frequency of book reading and note taking was less than computer usage. Lastly, there were a few main reasons why people changed their seats: 1) they were looking for a power outlet; 2) to avoid sun glare (this circumstance is strictly to the public/alone zone); and 3) to switch the main activity (such as from eating to studying and only applied to the public/together zone there are multiple seating option). For all other areas, no matter where the users sat, their informal learning experience within in the space was fairly similar to each other.

The comparisons revealed many useful insights about the space, from both environmental variables and users’ actions. There are positive and negative aspects of the space in terms of how well it supports users informal learning activities. One thing can be confirmed, the space is not supporting the informal learning space at its full potential.

The Hub

Overview

Looking at the overall data recorded and analyzed from the systematic observation, data revealed user action categories shared high level of similarities. This section reviews some of the categories that were found to be consistent across all four zones within the Hub.


**Food and drink**

Food and drinks stayed at a fairly high and consistent level throughout all observation subjects in all four zones. This was to be expected and very similar to the circumstances in FCCC. The Hub had a kitchen as well as a café built-in. It was very convenient for students to purchase food and drinks at this location. Every observation subject had some form of drink with them, whether it’s their own water bottle, or a cup of coffee/soda purchased from the café. Not every observation subject had food with them during the observation. The overall frequency of people consuming food was little lower than drinks, but stayed fairly consistent throughout public/alone, public/together, private/together, and public/together zones. Survey data also showed that students had a high satisfaction level with the availability of food and drinks within the space. During the survey, for individual study, students were asked the question about their favorite physical aspect. One question on the survey was, ‘Which following physical aspect do you like the most within the space?’ Aside from the physical location of the Hub, 81.6% of the survey respondents chose the availability of food and drinks. For group study, the survey result shows an even higher percentage, of 73.2% of respondents chose the availability of food and drinks as their favorite aspect of the environment.

From both the observation session and survey data, it was obvious to see food and drinks play an important role during the informal learning activities. Food and drink may not be an absolute necessity to engage informal learning, but it can certain shape the café into the right environment, which boosts the experience and efficiency of informal learning.

**Study tools**

The use of study tools does not apply to the Hub because there were no study tools being offered in the space. The Hub was located very close to the university’s library, which
offers a wide range of study tools. It is not the convenience option, but this may have affected the main functionality of the Hub. This was one interesting difference between the Hub and FCCC that may cause different user behaviors.

During the survey, students were asked about their main reasons not to studying at the Hub. Only 8% of the survey respondents selected “Inadequate success to study supplies”. During their periods of stay at the Hub, study tool may serve as a nice addition to other services provided, but not absolutely necessary.

**Computer usage**

According to the data collected from the systematic observation sessions, computer usage at the Hub maintained at a very high level. Not only did every observation subject had a computer with them during the observation period, they were also constantly interacting with the device. Across all four zones, observation subjects were constantly reading or watching the computer screen or typing on the keyboard. In certain situations, such in the public/together or private/together zones, computer screens were often shared with group member for information sharing. At the Hub, computers were a major tool for students informal learning activities. Computers were very dynamic and flexible tools, they appear to support students’ informal learning activities in a variety of ways.

**Power outlets**

One interesting fact about the Hub discovered during the casual observation, unlike FCCC, was that power outlets were spread out throughout the entire space. The Hub only had a few power outlets for students to use among all four zones, and they were not located in the most convenience location. Given the Hub was a very old building on campus, which was original built in 1892, it may explain why the power outlets were not implemented well in the space. During the observation sessions, most of the observation subjects, would still use
computers as their primary tool for informal learning. All of the computers remained unplugged during the observation sessions.

As computers are major tools for students informal learning activities, not providing sufficient amount of power outlets within the space could potentially cause a negative impact on students informal learning experience. During the survey, students were asked about the satisfaction of the power outlet situation at the Hub and 46.80% of the respondents were not satisfied with the power outlet situation at the Hub; 31.6% of the respondents remained neutral. Combine the results from the systematic observation and survey results, it was clear that availability of power outlets was a necessary element to support students’ informal activities, and the Hub is lacking on this aspect.

**Personal belongings**

During the observation sessions throughout all four zones, observation subjects often put their personal belongings, such as backpack or clothing, on the table or seat close by. If the seating area only offered singular seats, users would often locate their belongings on the floor, close to their seats.

From the observations, these actions may potentially cause two problems within the space. First, the majority of the seating types within the Hub were grouped seats for two or more people. If personal belongings take up some of the table space or seating space; then the space was not used efficiently. Second, when users’ personal belongs are placed on the floor, they sometime will intrude into the narrow main circulation. Users needed to adjust the location of their personal items from time to time in order to not obstruct the main circulation. These findings may reveal the need for storage solution of some kind. Given the nature of the café, a designate storage place for all users might not be ideal. However, having
a storage solution of some kind may change how the space is being used and increase the overall informal learning experience as well.

**Private/alone vs Public/alone**

Palette of place and environmental variables are discussed together as they are closely tied together. This section mainly discusses how the physical environmental factors differ from zone to zone.

**Environmental variables**

Private/alone zone and public/alone zone are not physically close to each other and the environmental variables within these zones were different from one another. First, the seating types were drastically different from each other. The private/alone zone featured banquette seating combines with loose chair furniture and the public/alone zone featured a row of bar height seating against a full height glass window. The window offered a great view to the central campus. According to the casual observation, there is a massive amount of natural sunlight come through this zone, resulting the lighting level in public/alone was higher than the private/alone zone. Because of the big opening, the public/alone zone was the brightest zone of all four zones. Due to the locations, private/alone zone offered the users a lower noise level, better acoustic privacy, and better visual privacy than the public/alone zone. Private/alone was also less crowded than the public/alone zone as public/alone zone was located right beside the main circulation path of the space.

**User interactions**

**View nature**

View nature was closely related to the interior environment as well as its relationship to the outside environment. During the informal learning process, the interior environment
and the views to the outside may have a certain degree of impact on students informal learning experience.

Before discussing the observation results, it is necessary to briefly go over the basic visual interests of these two areas. Public/alone offer a huge full height glass window to the students, which gave users a great view of the campus. The overall color palette of private/alone zone is rather neutral, and the only visual interests are photographs on the wall.

How people reacted to these visual interests between these two zones were very different. In the public/alone zone, the observation data results showed that the students who sit in this area have a much higher frequency of looking outside. The exterior environment was constantly changing, such as lighting conditions and scenery, which could act as external stimuli for the students. This could be beneficial for students; however, the interior environment of private/alone zone was rather static and less interesting. Students technically had a view to the exterior, but it was through a much smaller opening that was further away from the area.

_Furniture comfort_

The seating options offered by the public/alone zone and private/alone zone was completely different. The public/alone zone featured a row of bar height seats and the private/alone zone offered banquette seating with loose chairs. Overall, from students’ actions collected from the observation session, students had a higher satisfaction level in the private/alone zone than in the public/alone zone. Users in the private/alone zone tended to move their chairs or adjust their positions less frequently than the users in public/alone zone. This may due to the fact that private/alone zone offered two types of seating, banquette and loose furniture chair. People had options to choose what works the best for them. In
in the public/alone zone, the user only got one type of seating and it might be hard to accommodate everyone in this scenario.

**Workspace adjustment**

In term of work surface real estate, the tables featured in the private/alone zone was longer and wider than the bar height counter offered in the public/alone area. Generally speaking, students who sat in the public/alone zone had less space to work than students who sat at private/alone zone. However, the difference did not cause dramatic differences between the two zones in term of the workplace adjustment. The frequency of workspace adjustment in these two zones were fairly similar, as they were on the relative low end of the spectrum. As these two zones were both “alone” spaces for individual use, the table top space offered in these two zones were sufficient for individual use.

**Books and notes**

In addition to the computer usage, reading books and note taking were two major actions of informal learning. However, when compare to computer usage, the frequency of using a book or a notebook was much lower during the observation session. The frequency of using books and taking note in these two zones were fairly similar.

**Seating options**

During the all the observation sessions of these two zones, most of the observation subjects did not change their seating location. One user switched from the public/alone zone to the regular height table in private/alone zone. The intention was unknown, but it was fairly crowded in the public/alone zone during the observation session. The private/alone zone offered lower noise level, better acoustic privacy, better visual privacy, and was less crowded.
Private/alone vs Private/together

Environmental variables

In the private/alone and private/together zones were identical in terms of environmental variables to one another. The private/alone zone offered banquette seating with loose chairs and the private/together offers regular height table with four seats across from each other. For these two zones, both were illuminated mainly by the artificial lighting and the light level in these two zones were average. Because they both were located on the north of end of the space, it made the two zones relatively far away from the main crowd resulting in lower noise level and a good amount of visual and acoustical privacy. The entire café was an open space and students can check out whether there are open seats in these two zones without actual being in the zones, which make them less crowded.

View nature

The overall color palette of these two spaces were fairly neutral. Private/alone zone features serval photographs along its back wall while the private/together zone features photographs on the wall it sits against and three windows opening which offer a view to the outside.

During the observation sessions, the private/together zone observation data results showed that the students who sit here have a much higher frequency of looking outside.

Furniture comfort

In terms of furniture type offered in the two zones, they are similar to each other. The private/alone zone offers banquette seating with loose chairs and the private/together zone offers four loose chairs around a regular height desk. Because the private/alone zone offers one more type of seating for students to choose from. The frequency of adjusting the chairs
and postures was lower in the private/alone than in the private/together. As a result, when people have options to choose what works the best for them, they tend to be more satisfied.

**Workspace adjustments**

The tables provided in both zones offer the same amount of table surface area. The difference between them was how people utilized them. In the private/alone zone, each table was used by only one student, users tended to have more space. In the private/together zone, the table top was share by two or more users. People often find themselves needing to adjust the position of their laptops or other belongings to accommodate each other; therefore, the frequency of workspace adjustment was much higher in the private/together zone than in private/alone zone.

**Books and notes**

The overall frequency of reading books and taking notes was on the lower end of the spectrum. When comparing the data between the two zones, the action count was lower in the private/together zone. This may be caused by the table top surface was shared by multiple users.

**Seating options**

During all observation sessions of these two zones, none of the observation subjects moved to another seat or zone. This may be due to the fact that the seating option across the two zones were fairly similar. Though there were other seating options, there was no real benefit of switching seats or locations.

**Private/alone vs Public/together**

**Environmental variables**

In terms of physical layout and locations, the private/alone and the public/together zones were dramatically different from one another. In terms of seating options, the
private/alone zone offers mainly banquette seating with loose chairs, while the public/together zone offers a total of four types of seating: 1) banquette seating with loose chairs; 2) regular height tables with four seats across from each other; 3) regular height tables with two chairs across from each other; and 4) single sofa. These seats were not necessarily grouped all together and they were placed around the two-major entrances of the café. The private/alone zone was mainly illuminated by artificial lighting and the public/together zone was mainly located against the west side wall, which had more access to natural sunlight. The resulted in that the public/together zone had a higher light level than the private/alone zone. Base on the location of the two zones, the private/alone zone was generally quieter and offered better visual and acoustic privacy as well as being less crowded.

**User interactions**

**View nature**

From a visual interest stand point, the private/alone had few photographs hanging on the wall. In addition to the framed photographs, there were few things in this zone for the user to look at. For the public/together zone, there were also a few framed photographs hanging on the wall. Additionally, there was a black board with some graphics on the Southwest corner of the public/together zone and the public/together zone also had visual access to the order counter of the café. Unfortunately, neither of these two zones had direct access to the exterior environment.

From the observation data, the frequency of people looking up or around from these two zones were about the same. Users in these two zones did not seem to be intrigued by the photographs or the black board. For comparison purposes, the action counts for this category was lower than in the public/alone zone.
**Furniture comfort**

The public/together zone offers a totally of four types of seating. The private/alone zone offer two types of seating. The data from systematic observation showed that the overall frequency of people adjusting their chair or positions in the public/together zone was lower than in the private/alone.

**Workspace adjustments**

The workspace adjustment frequency was higher in the public/together zone than in the private/alone zone. In the public/together zone there were table top that were shared by two or more users. People often had to shift things around to accommodate each other and themselves.

Table top size was a critical element for informal learning activities. When designing, offering the right table top size within the right zone can, not only help planning, but also assist users’ informal learning experience.

**Books and notes**

The overall frequency of reading books and taking notes was on the lower end of the spectrum. When comparing the data between the two zones, the action count was lower in the public/together zone. This may be caused by the table top surface which was shared by multiple users.

**Seating options**

During the observation sessions of these two zones, most of the observation subjects did not change their seating locations. However, there was one detail discovered during one of the private/alone zone observation sessions. During the session, the observation subject was studying alone in the private/alone zone and then a few moments later, her friends stopped at her desk, sat down, and shared the table with her. Because the seating in
private/alone zone can host a maximum of four people, there was not an issue that they were sharing the same table. There wasn’t a clear boundary between the private/alone zone and private/together zone; they were all blended together.

This observation detail revealed a problem of this space, there was not a truly private zone within the café. Students have the option to study at certain location by themselves; however, it is easily interrupted by other people.

**Public/alone vs Private/together**

**Environmental variables**

Based on the location of these two zones, the public/alone zone features great light quality, a lot of natural sunlight, and a great view to the campus. The light level in the public/alone area was higher than in the private/together zone. However, due to public/alone zone being close to the main circulation, the noise level was higher, acoustic privacy and visual privacy was lower, and the space was more crowded. However, given the nature of these two zones, the environmental variables match the characteristics of these two zones quite well.

Before comparing the data collected from the public/alone zone and the private/together zone, it is worth noting that private/alone and private/together are similar in many ways, therefore the comparison results may share similarity as well.

**User interactions**

**View nature**

In the private/together and the public/alone zones both have large window openings adjacent to them. During the observation session, the frequency of people looking through these openings was similar and at the higher end of the spectrum.
Window openings in these zones offered portals to the outside environment and also let the outside environment into the space, such as natural sunlight.

**Furniture comfort**

Unlike the private/alone and the public/together zones, the seating options offered in these two spaces are both lacking variety. The private/together zone offered seating height tables with four loose chairs, two on each side, and the public/alone zone had one bar height table and bar height chairs. From the observation result, the satisfaction level of the furniture comfort in these two zones were on the lower end the spectrum as people are frequently adjusting their chair or positions.

The result further shows that people tended to be more satisfied with the furniture comfort when there are more seating options.

**Workspace adjustment**

Similar to other “alone” zone vs “together” zone comparisons, workspace adjustment frequency was higher in the private/together zone than in the public/alone zone. In the private/together area, the table top was shared by two or more users. People often had to shift things around to accommodate each other and themselves.

**Books and notes**

Reading books or taking notes actions happened on a minor degree during these observation sessions. For both the public/alone zone and the private/together zone, the action count for this action was similar and both on the lower end of the spectrum.

**Seating options**

During the all observation sessions of these two zones, none of the observation subjects moved to another seat or zone. This may be due to the fact that the seating options
across the two zones were fairly similar. Even when there are other available seating options, there was no real benefits of switch seats or locations.

**Public/alone vs Public/together**

**Environmental variables**

In terms of location, the public/alone zone was blended into the public/together zone as they were both located along the west wall of the café. Therefore, they were expected to share some similarities in their environmental variables. What differed from one zone to another was their seating types. As previously mentioned, the public/alone zone featured bar height seats for individual use and the public/together zone offered a total of four types of seating. Both zones are exposed to natural sunlight; however, due to the size of the openings on the wall, the light level of the public/alone zone was higher than the public/together zone. Both zones were located close to the main circulation and waiting area, which made these two zones have higher noise levels and lower acoustical and visual privacy. In terms of crowdedness, both zones were fairly crowded, especially during the busy hours.

**User interactions**

**View nature**

The public/alone zone and public/together zone were both located against the west side wall of the café. From a space planning perspective, the public/alone zone was blended together with the public/alone zone. As they are both “public” zones, that layout makes the space feel more dynamic while maintaining the characteristics of these spaces.

In terms of the visual interests, the public/alone zone had a large window opening that offers a view to the outside. Even though the public/together zone was in the same area as the public/alone zone, the window openings in the public/together zone was less than the
public/alone zone. The observation results show that the frequency of people looking outside was higher in the public/alone zone than in the public/together zone.

**Furniture comfort**

The public/together zone offered a total of four types of seating and the public/alone zone offered two types of seating. The data from the systematic observation shows that the overall frequency of people adjusting their chair or positions in the public/together zone was lower than in the public/alone zone.

**Workspace adjustments**

In short, the workspace adjustment frequency was higher in the public/together zone than in the public/alone zone. In the public/together zone there were table tops shared by two or more users. People often had to shift things around to accommodate each other and themselves.

**Books and notes**

Reading books or taking notes actions happened on a minor degree during these observation sessions. For both the public/alone zone and the public/together zone, the action count for this action was similar were both on the lower end of the spectrum.

Book reading or note taking can be categorized as informal learning actions; however, with people using computer as their primary tool for informal learning, everything can be done digitally. Additionally, in “together” zones, the table top surface shrinks when share with other users. This may suppress the action of book reading or note taking.

**Seating options**

During the observation sessions between these two zones, none of the observation subjects changed seats in the public/together zone. However, two students in the public/alone zone moved over to the private/alone zone during the observation sessions. While they were
in the public/alone zone, their prior activity was eating. After finishing dining, they had moved to a different spot. The take away for this is that the bar height table and chair may not be the best option for certain people for informal learning.

**Public/together vs Private/together**

*Environmental variables*

The public/together zone was located close to the private/together zone. However, private/together was mainly illuminated by the artificial lighting and the public/together zone was mainly lit by natural sunlight along with the artificial lights. Resulting in the lighting level for the public/together zone was higher than the private/together zone. The private/together zone was located in an area with less travel and away from the main circulation and waiting area. The noise level was lower, less crowded, and provide a better experience in terms of acoustic privacy and visual privacy.

*User interactions*

*View nature*

The public/together zone and private/together zone both offered a few openings which provide views to the outside. From the observation data, the frequency of people looking through the window into the exterior environment was about the same in these two zones. The action count for this action was slightly lower than in the public/alone zone, but overall comparable to one another.

*Furniture comfort*

As expected, the frequency of people adjusting chairs, tables, and postures was higher in the private/together zone than the public/together zone. Hence, the more seating types may lead to higher satisfaction toward furniture comfort.
**Workspace adjustments**

As these two zones were both “together” zones and table tops were often shared by multiple users. This situation could lead to constantly shifting things around in order to accommodate the needs of others and themselves. According to the data collected from the systematic observation, both spaces were heavy on these actions of workspace adjustments.

**Books and notes**

Reading books or taking notes actions happened to a minor degree during these observation sessions. For both the public/together zone and the private/together zone, the action counts for this action were similar to each other and they were both on the lower end of the spectrum.

**Seating options**

During the observation sessions of these two zones, most of the observation subjects did not change their sitting locations. One of the observation subjects from the public/together zone, who was sitting on the single sofa moved to a sitting height table. He was engaging in typing actions, which the flat surface, as well as the sitting posture the table provided a better situation than the sofa.

**The Hub Summary**

Similar to the comparisons conducted for the FCCC, the comparisons across all four zones at the Hub, not only pointed out certain problems of the space but also revealed meaningful findings that would greatly impact the informal learning experience for students.

First, casual observations provided the study a general idea of how people were using the space. Based on that and environmental variables, the space was being categorized into four different zones. During the comparisons, the environmental variables of each zone
matches the characteristics and atmosphere of each zone fairly well. The private zones were generally quieter, less crowded, and provided more privacy than the public zones. However, there were still potential problems of the space zoning, such as not clear boundaries among all zones. Boundaries among zones were very blurry for the users. They cannot be identified with distinct characteristics (i.e., a specific furniture type, certain environmental variables, etc.). Because of the open design of the café and the not so clear zoning of the space, users informal learning activities may not be fully supported by these zones.

For the Hub, looking at the data collected throughout the observation sessions, some user actions were fairly similar and consistent. Food and drinks could always be found during all observation sessions. They might not be absolute necessary elements for the users to engage in informal learning, but they can render a more casual and informal atmosphere and make users better differentiate themselves from a formal learning environment. The frequency of computer usage was on the higher end of the spectrum across all four zones. Computers are becoming a main tool for students informal learning activities. However, the space does not provide enough power outlets for students to utilize. The café does not provide many electrical power outlets. As a result, students were using computer as their main tool, the space does not have the necessary elements (i.e. power outlets) to support this action. Personal belongings may also be a potential problematic aspect. The observation revealed that there was no dedicated storage area for people to store their personal belongings, so they are often occupying table top space and seating space. If they are being put on the floor, they might partially interference with the circulation path. Last, previously mentioned in this paper that reading books and taking notes can be categorized as informal learning activities as well; however, the observation results have shown that these actions are
fairly low for all observation sessions. This action may be due to the fact that these actions have been translated into interactions with the computers.

Besides the elements that stayed fairly consistent throughout the observations, there were also user actions that were dramatically different from one zone to the other. Through the comparisons of all four zones in these elements, some trends of users’ actions are revealed. First, whenever there was something visually interesting, (i.e., design feature or a portal to the exterior environment) users are likely drawn to these elements. The design feature or the window view may potentially serve as positive external stimuli between users’ informal learning process and improve their learning experience and potential productivity. Secondly, when comparing data collected across all the observation sessions, users tended to be more satisfied with the furniture comfort when there are more seating options. The observation result on workspace adjustment also revealed some meaningful insights. As the fact that the café does not offer much seating variations, especially in the private/alone zone and private/together zone. Users who seat in the private/together zone are essentially getting as much of the table top space as the person who sat alone at the private/alone zone. It might be desirable to have a large table top surface for a single user; however, became somewhat problematic for two or more people to sharing the same sized table top. People may have to constantly shift things around to accommodate for each other. Lastly, there had not been many people shifting their seating location during the observation; however, similar to the observation in FCCC, there was a trend that people may relocate their seating location when switching tasks.

Again, the comparisons of the data collected from the observation sessions have revealed many meaningful insights of users’ behavior and also many problems of the space.
The next section summarizes the findings discovered in both FCCC and the Hub to see what the space had done right and what could be improved to support informal learning better.

**Conclusion**

Both the FCCC and the Hub are unique spaces on their own and they support users’ informal learning activities in different ways. The FCCC provides study tools like printers and computer stations while the Hub offers more seating types and better space zoning. The user actions revealed many trends on how students utilize the space for informal learning activities and pointed out problematic aspects of the existing space that may not support students’ informal learning. This section of the study summarizes these aspects by combining the analyzed data from both spaces and proposes a solution that will better support students’ informal learning activities.

**Environmental variables and zoning**

Splitting the space into four zones would make the space more dynamic. Users would have the option to choose locations that best suited their activities. However, neither FCCC nor the Hub was designed with the four zones in mind and each of the four zones in these two cafés may not be equipped with the right environmental variables. Therefore, the boundaries among the zones are blurry.

In order to design a functional space that supports informal learning activities (based on the traits, advantages, and disadvantages of the existing structure) the zoning of the space needed planned out during the schematic phase of the design. Planning in advance would ensure the design would take advantage of the existing structure and the space, such as placing the public area at a more open and naturally lit space.
In term of environmental variables, it is necessary to establish a reference value for the next step of this study, which is to create an informal learning space based on the findings of observation sessions and survey data.

**Table 4.** 4 space types environmental variable comparison (reference, on a 1-5 scale)

<table>
<thead>
<tr>
<th>Environmental Variable</th>
<th>Private/alone</th>
<th>Public/alone</th>
<th>Public/together</th>
<th>Private/together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Level</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Noise Level</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Acoustic Privacy Level</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Visual Privacy Level</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Crowdedness</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

These values for the four zones function as a reference for future design planning and decisions. These values of the environmental variables are based on a 1-5 scale and are based on the environmental variable’s values gathered in FCCC and the Hub.

**Food and drinks**

Food and drinks are not directly related to informal learning activities; however, during all the observation sessions and survey results, food is closely related to informal learning and tend to have an impact on students informal learning experience. During the observation session, every single observation subject across all four zones had some sort of beverage or food with them. It is safe to say, in order to best support students’ informal learning activities, offering food and drinks is essential within the space.

**Computers and power outlets**

As an informal learning space, it should support its user for long and short-term stays. The study has discovered that computers are students’ main tools for informal learning. In order to support this action at its maximum potential, the space should have a sufficient
amount of power outlets to power these devices and enable students to work for longer periods of time.

In addition to providing the right amount of power outlets for the space, it is also important to know where these power outlets should be located in order to achieve maximum efficiency. The study has found that “together” zones require more power outlets than “alone” zones. In order to fully support users learning activities, power outlets can be strategically place based on the four zones.

**Study tools**

From the analysis of the observation results, study tools are mainly used by group work users on a not-so-frequent basis. It is safe to say that study tools such as printers and computer stations are not necessary elements within the informal space; however, if the design intent is to maximize the ability for the space to fully support users’ informal learning activities, study tools are always welcome. Additionally, based on the observation data, study tools can be strategically placed adjacent to the “together” zones as group work users have higher tendencies to use these tools.

**View nature**

Visual interests, such as design features of the interior environment, graphics, or view to the outside environment are always welcome by the users of the space. They often can serve as external stimuli in-between users’ informal learning activities to enhance their experience while in the space.

**Furniture comfort**

Furniture comfort is closely related to how many seating types are provided in each zone. The study found that observation subjects were more satisfied with the furniture comfort when there are more types of seating they can choose from. For future design,
providing different seating types in each zone can better support people’s informal learning experience.

As the comparisons among these four zones proceed, a trend regarding furniture comfort seem to surface. When users have more seating types to choose from, they seem to be more satisfied with the furniture comfort.

**Workspace adjustments**

Workspace adjustment is a continuation of the furniture comfort category. More seating types may increase the satisfaction level of the furniture comfort and may help with the workspace adjustment as well. This problem exhibits in both the FCCC and the Hub, in both individual study and group work, the majority of the furniture provided are the same throughout the space. It may work for individual study users as these table are big enough for singular use; however, the table became insufficient for group work, especially when it’s at its full capacity. The take away from the analysis of these results is that to decrease the frequency of the workspace adjustments, the key is to provide the right types of furniture in the right zones. For instance, if the zone is mainly for individual users, the table size offered in this zone can be smaller or vice versa.

It is worth noting that providing a variety of types of furniture could help users with their furniture comfort level as well as enhance their studying experience. It is also important to figure out the correct type for certain zones.

**Books and notes**

Reading books and taking notes can be categorized as informal learning activities. However, the overall of frequency of these actions are lower than the computer usage action. This finding enhances the power outlet category and that the space should provide enough
power outlets to the users in order for them to continue their informal learning activities with their main tools (i.e., computers).

**Seating options**

Seating options refer to the fact that users have the option to change their seating location. The observation shows that the frequency of people changing their seating location is on the lower end of the spectrum. The major reason behind the minimal seat changing action could be the similar seating conditions throughout the entire space. There are not real benefits for changing locations as the experience stays similar. For the serval people who changed their seating locations, the motivation behind these actions are; 1) switch tasks; 2) looking for power outlets; and 3) the current location poses a certain problem that is not desired by the users (i.e., sun glare).

It appears that the major motivation behind changing seating locations were caused by the issues existed in the space, such as the seats were not dynamic enough; there were not enough power outlets, and no window shades were provided. These smaller things could vastly improve users informal learning experience as well.

**Additional survey findings**

Additional to the systematic observation results and related survey data. There were a few additional findings revealed by the survey that are worth mentioning.

**Satisfaction towards the overall design**

During the survey, students were asked the question “How satisfied or dissatisfied are you with the overall interior design here?” For the FCCC, 48% of the survey respondents remained neutral and 20% of the respondent chose dissatisfied and very dissatisfied. For the Hub, 42% of the survey respondents remained neutral and 26% of the respondent chose dissatisfied and very dissatisfied.
As stated previously in the systematic observation comparisons, the color palette of the space was mainly neutral colors and both spaces are lacking design features and visual interests. Design features and visual interests are certainly not the main determining factor of students’ informal learning experience; however, the “view natural” action observed during the systematic observation revealed that visual interests, such as a view to the outside, may serve as visual stimuli to help enhance the informal learning experience.

**Most dissatisfied aspects of the space**

In order to better support students informal learning activities and better accommodate students’ dynamic needs, good initial planning of the space is critical. During the survey for both the FCCC and the Hub, students were asked the question “What are the main reasons you do not study here?” The most selected answers were that the spaces were overcrowded, there was a lack of privacy, and high noise levels. These are somewhat reflected in the systematic observation as well. Both spaces are open spaces with no privacy screens, dividers, or partition walls installed within the space. Because the spaces are quite open, users would have less control of noise and crowding. In the previous chapter, it was stated that the zones within each space was not quite clearly divided, which at times resulted in overly crowded zones that were supposed to be more private.

There are things that can be done to strengthen the observation findings and data collections. The next step of the study is to use the data collected from both spaces to design a place that would support students’ informal learning at its maximum.

**Comparisons between FCCC and the Hub**

The comparisons among the four learning zones of the FCCC and the Hub has revealed interesting insights on their environmental variables as well as users’ behaviors. The investigation engaged the comparisons of the same elements between FCCC and the Hub.
This takes the study one step future to better understand the differences between the two cafés and how these differences impacted users’ behaviors.

**Overview:**

In order to understand the differences between the two spaces, the comparisons between the FCCC and the Hub compared the following elements of the same zone; environmental variables, power outlets, study tools, view nature, furniture comfort, workspace adjustments, books and notes, seating options, food and drinks, computer usage, and personal belongings. Similar to the previous comparisons, the direct comparisons among the four zones of the two cafés utilized the data collected from both the survey and the systematic observation session. Additionally, the comparisons compared the same zones between the two cafés, and no cross-comparisons have been made for this section.

There are serval elements that are largely different in these two cafés and serval elements in both spaces that had a high level of similarity. The following overview section is to go over these elements in both spaces first of which are the two elements that are different.

**Power outlets**

In term of power outlets, the FCCC offers a number of outlets along the walls but none in between. To be more specific, the private/alone, the public/alone, and the private/together zones all have access to a power outlet and the public/together zone does not. The situation at the Hub is different. There are no user accessible power outlets for all four zones. If users ran into the situation where they need to charge their devices, the only solution would be going somewhere else. During the survey (for both individual and grouped learning activities) students were asked questions on their satisfaction on accessing electrical power outlets. For individual study, 52.1% of the survey respondents in the FCCC responded with an answer of satisfied and very satisfied and 26.3% of the FCCC respondents remained
neutral. For group work, the overall satisfaction was a lower at 36.2% of the survey respondents in the FCCC responded with an answer of satisfied and very satisfied. At the FCCC, 28.2% of the respondents remained neutral. Due to missing the electrical power outlet feature, users were not satisfied with this particular element. For both individual and group study, 16.3% of the survey respondents from the Hub responded with the answer of satisfied and very satisfied and 31.60% of the Hub respondents remained neutral.

In this instance, FCCC supports students’ informal learning activities better than the Hub. It is not hard to conclude that users have a high demand for power outlets from the environment in order to fully support their informal learning activities. As the results of the systematic observation have concluded that students are using computers as their main tools for informal learning these power outlets are essential. Power outlets would be able to allow students to stay for an extend period of time if needed; therefore, support their learning activities.

**Study tools**

In terms of study tools (similar to the power outlet situation) the FCCC offers a few computer workstations and a set of printers for students to use. However, the Hub offers no public study tools for students to utilize. During the systemic observation sessions, the study tools in the FCCC were often utilized by students doing group work to print out additional study material and the utilization rate of these tools was on the lower end of the spectrum. In other words, study tools are generally great additions to the informal learning cafés. However, the utilization rate of these tools tells us that these tools are not absolutely necessary for the space. For instance, the Hub offers no study tools for public use at all, but students still find it is an overall great place for informal learning.
In addition to the two interesting differences of the two cafés, there are a few elements of the two spaces that shared a high level of similarity.

**Food and drink**

Food and drinks stayed at a fairly high and consistent level throughout all observation subjects in all four zones of both cafés. The FCCC and the Hub both have a kitchen as well as a café built-in. It is very convenient for students to purchase food and drinks at these locations. In terms of drinks, every observation subject had some form of drink with them, whether it’s their own water bottle, or a cup of coffee/soda purchased from the café. Food wise, not every observation subject had food with them during the observation. The overall frequency of people consuming food was lower than drinks, but they stayed fairly consistent throughout the public/alone, public/together, private/together, and public/together zones. At the Hub, students have easy access to food and drinks. Survey data also shows that students had a high satisfaction level with the availability of food and drinks within the space. During the survey, for individual study, students were asked the question about their favorite physical aspect. One question on the survey was, ‘Which of the following physical aspects do you like the most within the space?’ For individual study, 81.6% of the Hub survey respondents chose the availability of food and drinks. For group study, survey result also showed a high percentage, a totally of 73.2% of the Hub survey respondent have chosen the availability of food and drinks as their favorite aspect of the environment. The FCCC shows a similar result for individual study, 89.4% of the survey respondents had chosen the availability of food and drinks and the most valued aspect of the space. For group study, a totally of 92.1% of the survey respondents chose the availability of food and drinks as their favorite aspect of the environment.
From both the observation session and the survey data, it is obvious to see food and drinks play an important role during the informal learning activities. Food and drink may not be an absolutely necessary element to engage informal learning, but it can certain shape the café' into the right environment, which boost the experience and efficiency of informal learning.

**Computer usage**

Despite the drastic differences on the power outlet condition of the two cafés, another user action that remains on the higher end of the spectrum is computer usage. Across the four zones in both cafés, the computer usage appears to be very frequent during the observation sessions. Aside from eating and drinking activities, using the computer was the major activity during the observation period. Observation subjects were very often reading and watching the screen and/or typing on the keyboard. It seems like computers have become one of the major tools for informal learning, as they appear to be a dynamic device themselves.

One thing worth noting, the lack of power outlet at the Hub did not stop students from using computers, every observation subject had high computer usage frequency.

**Personal belongs**

The observation session was engaged during the winter. When students usually have heavier clothes. Whenever they decide to stay in the café for an extend period of time, their clothing and backpacks are usually placed on the adjacent chair or table. This action is fairly consistent throughout both spaces. Through the observations of all four zones and users in these two cafés, personal belongings take up certain table, chair, or floor space. Sometime personal belongings will intrude into the major circulation area and people have to adjust the location of their personal items from time to time. The findings may potentially reveal the
need for storage solutions in order to make the overall space more functional and improve their personal informal learning environment.

**Books and notes**

Reading books and taking notes are two other major informal learning actions besides computer usage. However, across all four zones in the two cafés, when comparing the frequency of book reading and note taking to the usage of computer, it almost became negligible. All four zones of these two cafés all have very low action counts for the action booking reading and note taking.

**Public/alone**

**Environmental variables**

The environmental variables of the public/alone zones in both cafés share a lot of similarities. Public/alone zones in both cafés were located against the window wall, which means the zones are mainly lit by natural daylight. The light levels of both zones were the highest among all four zones. Due to the open design the café, there were not any acoustical or visual treatment in this area. The acoustic privacy and visual privacy for the public/alone zones in both cafés were on the lower end of the spectrum. What really made the two zones different was the locations of these zones. The public/alone zone in the FCCC was located on the north end of the public seating area, which was a fairly quiet and uncrowded zone. On the contrary, the public/alone zone at the Hub was located in the middle of the circulation area. Compared to the public/alone zone at the FCCC, it was more crowded and louder.

During the survey, students were asked the question whether the space was overcrowded for individual study. This question does not directly relate to the public/alone, but reflects users’ attitudes toward this zone. For the FCCC, only 7.9% of the survey respondents think the space was overly crowded for individual study. However, 31.6% of the
Hub survey respondent think the space was overly crowded for individual study. Considering the location of these zone relative to the entire spaces, as well as the levels of crowdedness, survey data shows that users tended to be more satisfied with the level of crowdedness for the public/alone zone. In this case, the public/alone zone in the FCCC was quieter and less crowded and offered a better environment for students to engage informal learning.

**User interactions**

*View nature*

The public/alone zones in both the FCCC and the Hub offer unobtrusive views to the exterior environment and the view through the window openings were rather similar. From an interior stand point, the colors of both spaces were fairly neutral, and there wasn’t any design feature or focal points within these two spaces.

During the survey, students were asked a question about how satisfied or dissatisfied were they with the overall interior design of the FCCC and the Hub, separately. The more than half of the survey respondents answered the question with “neutral.” For the FCCC, 56.8% of the survey respondent selected neutral and 58% for the Hub. The result of the survey could be translated to the space as rather boring, there are no interesting features to be focused on, and the spaces themselves were geared towards functionalities over aesthetics. These results also heavily coincide with the results of casual observation.

The view nature action, since both of these public/alone zones sit against window walls, observation subjects in both of these zones had higher frequencies of looking through the window into the exterior environment. Surprisingly, the action counts between these two zones were very similar and both were on the higher end of the spectrum when compared to other zones.
**Workspace adjustments**

The seating types offered in these public/alone zones are drastically different from each other. The FCCC’s public/alone zone offers desk height tables with four chairs placed across each other and the Hub’s public/alone zone was a linear bar height table and the seat placement was rather dense. In terms of work surface area, the desks in the public/alone zone of the FCCC provided a larger area than the Hub. People would have more space to layout their things and belongings at the FCCC then they would at the Hub. From the data collected from the systematic observation, the action of workspace adjustments was higher at the Hub than the FCCC. The more workspace adjustments, the more interruption students get throughout their learning period, which could have a negative impact on their overall informal learning experience.

The take away from this comparison is that how large or small the desks are could impact student informal learning experience. In this case, the desk top area per individual for the space at the Hub is too small and people had to constantly adjust their workspace to fit all of their belongings and accommodate for others at the same time. The FCCC’s situation is better than the Hub; however, seating offered at the FCCC’s public/alone zone was designed for four people, having one individual working at a desk that’s designed for four people could be a potential of waste as well.

**Seating comfort**

Both public/alone zones in the FCCC and the Hub offered only one type of seating and there were not any adjusting options offered by these seats. This one-size-fits-all approach wasn’t well received by users. Overall, the public/alone zone users from both spaces were not satisfied with the level of comfort of the furniture provided.
The survey data coincides with the observation data as well. During the survey, for individual study, students were asked a question about their least favorite physical aspect of the space and the top choice was furniture type. The results unveiled that neither standing height nor desk height could fully support students’ informal learning to their full potential.

**Seating options**

For the public/alone area in the FCCC, a few observation subjects had changed their seats during the observation session. One public/alone zone user changed to a new location due to sun glare. The public/alone area was located by the large window opening which created opportunity for sun glare to happen in this area. However, the window did not provide shade of any kind. Students have no choice but to move in order to continue their study.

For the public/alone area at the Hub, one observation subject switched from the public/alone zone to the regular height table in the private/alone zone. The intention was unknown, but it was fairly crowded in the public/alone zone during the observation session. The window in the public/alone zone at the Hub was facing west and there was a fair amount of buildings surrounding the area. It is unlikely to have a similar glare issue in the FCCC.

From the comparisons, the study concludes major reason why users may potentially switch seats are as follows: 1) sun glare and 2) crowdedness. These are certainly not the only reason for people to change seating locations. However, they do provide some degree of insight on how people think of the space.

**Private/alone**

**Environmental variables**

The environmental variables of the private/alone zones in both cafés share a lot of similarities. The private/alone zones in both cafés are located against a solid wall with
minimal openings, which means the space was mainly lit by artificial light and there were not any direct views to the exterior environment. Most of the environmental variables of these two cafés were comparable to each other, such as similar lighting level, noise levels, and crowdedness. The differences arouse in acoustic privacy level and visual privacy level. These differences were attributed to the planning of the space and the locations of these zones. The private/alone zone in the FCCC sits beside the public/alone zone. When compared to the private/alone zone at the Hub, the visual privacy and acoustic privacy was lower. However, the difference does seem indeed impact the user.

During the survey, students were asked a question about whether they are satisfied with the visual and acoustical privacy. For the FCCC, 50% of survey respondents felt satisfied or very satisfied with visual privacy and 42.1% remained neutral; 47.3% of the survey respondents felt satisfied or very satisfied with acoustic privacy and 39.5% remained neutral. For the Hub, 47.3% of survey respondents felt satisfied or very satisfied with visual privacy and 42.1% remained neutral; 31.5% of the survey respondent felt satisfied or very satisfied with acoustic privacy and 55.3% remained neutral.

Despite the difference in visual and acoustic privacy in these two zones, students seem to have a high tolerance level for these two environmental variables. There is no interesting data that shows the difference in these two factors has made a large impact on students informal learning experience.

**View nature**

Both private/alone zones sit against a solid wall. The interior environment of the private/alone zone was rather static and less interesting. Students technically have a view to the exterior, but it was through a much smaller opening than the public/alone zones and the
opening location was further away from the area. Therefore, the action of view nature in the private/alone zone in both cafés were much lower than the public/alone zones.

Unlike the public/alone zones, both private/alone zones were lacking in visual interests from both exterior and interior. Students did not have many opportunities to refresh themselves from an external stimulus, which may not be beneficial for long term study sessions.

**Workspace adjustments**

For both private/alone zones in the two cafés, the desk settings were fairly similar. They all featured the same size desk height table that held a maximum of four people. For the private/alone zone, most of the time a single individual would take up the entire desk that was meant for four people. The desk was large enough to hold one’s study materials and other personal belongs and they can be comfortably spread out. As a result, the action of workspace adjustment of the private/alone zone in both spaces were on the lower end of the spectrum.

Workspace adjustments can be considered small interrupts of the study flow. It is ideal to avoid unnecessary interruption throughout the informal learning session. In terms of the workspace adjustments, the private/alone zones in both cafés were supporting users’ informal learning activities in a positive way.

**Seating comfort**

The private/alone zone in the FCCC offered desk height tables with four chairs placed across from one another. The Hub offered a bit more variety, instead of four chairs, the Hub’s private/alone zone featured two chairs on one side of the table and a banquette seating on the other side. Comparing the actions of people moving their chairs and adjusting their
body posture, the frequency was relatively lower at the Hub than the private/alone zone the FCCC.

This result coincides with the previous finding that students tended to be more satisfied with seats when they have more furniture types. In this case, the Hub offered more seating types that the FCCC, which the users prefer.

*Seating options*

During the observation sessions, one FCCC observation subject in the private/alone zone changed their location due to the need for a power outlet. However, no change in location was recorded in the private/alone zone at the Hub.

**Public/together**

*Environmental variables*

The public/together zones in both cafés were located in most public and open areas. Therefore, the acoustic privacy levels and visual privacy levels were on the lower end of the spectrum. During the day time, both zones were mainly lit by artificial light and indirect natural sunlight; therefore, the light levels for the public/together zones in both cafés were about the same. The most interesting difference of these two zones in environmental variables were noise level and crowdedness.

The public/together zone in the FCCC was scattered around the fireplace, which was located at the center of the main dining zone. The tables were loosely placed, the space between different seating areas were fairly loose and spacious. The public/together zone at the Hub was very different from the FCCC, the public/together zone was located at the main and secondary entrance and seating was close to the order counter. The traffic flow in the public/alone zone was very heavy. Additionally, the seating of the public/together zone was very dense and there was very little room for circulation within the zone. The result of the
crowdedness and noise level the public/together zone of the Hub was higher than the public/together zone in the FCCC.

The differences did seem to impact the users significantly. During the survey, students were asked a question whether the space was overcrowded for group study. For the FCCC, 12.8% of the survey respondents felt the space was overcrowded and 43.6% of the survey respondents felt the space was not overcrowded for group study. For the Hub, 48.2% of the survey respondents felt the space was overcrowded and 25.9% of the survey respondents felt the space was not overcrowded or group study.

The data collected from the survey coincide with the systematic observation results and, in this case, the FCCC offered a public/together zone that was less noisy and less crowded, which better supports informal learning activities.

**User interactions**

*View nature*

The public/together zone in the FCCC did not have a direct view to the exterior environment; however, the public/together zone in the Hub did sit against a few window openings which allowed users to look into the outside environment. Similar to the previous comparisons, the action counts for view nature was higher at the Hub than the FCCC.

*Workspace adjustments*

In the public/together zone, tables were often shared with others. When table tops were shared, each person’s workable surfaces shrink. This led to a more frequent work space adjustment. The overall workspace adjustment of the private/together was higher on the overall spectrum.
Combined with the results of the study, it is concluded that the table size was more than enough to accommodate singular use; however, when shared with multiple people, the table top space may not be enough.

**Seating comfort**

Users tended to be more satisfied with the seat when there was a variety of types of furniture. Both public/together zones offered a variety of seating types. The FCCC’s public/together zone had desk height tables with chairs, sofa groups, and bar height seating. The Hub’s public/together zone offers banquette sitting, sofa group seating, and desk height tables with chairs. From the data extracted from the systematic observation, it is difficult to determine which zone had a higher satisfaction rating; however, users in the public/alone zone tended to have less actions of adjusting postures and moving chairs.

People tended to be more satisfied when they had more seating options that they could choose from.

**Seating options**

In the FCCC’s public/together zone, there was one group of two that moved from a group sofa seating to a regular height table set, during the observation session. The main activity while at the group sofa seating was dinning and having a conversation; however, when they finished eating and were ready to switch gears to studying, they switched to a different seating type. During the observation sessions at the Hub, no observation subjects changed their seating locations.

This section has unveiled that people tended to switch seating location when the current one is no longer best suited for their activities
Private/together

Environmental Variables

The environmental variables of the private/together zones in the FCCC and the Hub were not different from each other, drastically. The private/together zone at the FCCC sat against a solid wall with minimal openings, which means the zone was mainly lit by artificial light and there were not any direct views to the exterior environment. On the contrary, the private/together zone at the Hub sat against a north facing wall with three large window openings. The zone was mainly lit by the combination of natural sunlight and artificial light, resulting in the light level of the private/together zone as much higher than that of the FCCC. Other than the light level, the differences in noise level, acoustic privacy level, visual privacy level, and crowdedness were negligible.

The differences in lighting made a fairly large impact on users’ perception of the space. During the survey, students were asked a question about whether they were satisfied with the lighting for group work. For the FCCC, 32.4% of survey respondents felt satisfied or very satisfied with the lighting and 52.6% remained neutral. For the Hub, 73.7% of the survey respondents felt satisfied or very satisfied with lighting and 23.7% remained neutral.

The satisfaction level at the Hub was higher than at the FCCC and the main difference between the two spaces was the existence of natural light. Natural lighting may potentially be another factor that could enhance students’ informal learning experience.

User interactions

View nature

The private/together at the Hub had easy access to outside views; however, not the same with the private/together zone at the FCCC. Considering the interior of both zones were rather plain, the only visual interests were in the exterior environment. As a result, the action
count of view nature was higher at the Hub than at the FCCC. During the observation session, people were briefly looking out of the window.

In this case, the private/together zone in the Hub supports students; informal learning activities better than the FCCC. Students were likely to have beneficial views to the exterior environment at the Hub.

**Workspace adjustments**

In private/together zone, tables are often shared with others. When table tops are shared, each person’s workable surface shrinks. The overall workspace adjustment of the private/together zones was higher on the overall spectrum.

The result of the study concluded that the table size was more than enough to accommodate singular use; however, when shared with multiple people, the table top space may not be enough.

**Seating comfort**

Overall, observation subjects were not very satisfied with the level of comfort of the furniture provided in the private/together zone in both spaces. As previously mentioned in the casual observation, the seating type and furniture type were identical in both zones. During the observation, the subjects from both zones were adjusting chairs, as well adjusting their posture and occasionally adjusting the location of the table.

During the survey, students from both cafés were asked a question about their least favorite physical aspect of the spaces. For group study in the FCCC, 33.3% of the survey respondents selected furniture type, which was the second highest of all the choices given. For group study at the Hub, 35.9% of the survey respondents had selected furniture type, which was the highest of all the choices given.
Seating options

During the observation sessions, no changing seats or location was recorded in private/together zones in both cafés. The reason could be one of the following: 1) during that time of day, the space is fairly crowded and there was not much seating to choose from for a group of more than two people or 2) the seating option offered in the private/together zone was identical to each from all the environmental variables and there was no reason to change.

Summary

Throughout the comparisons of all four zones between the FCCC and the Hub, the results of the comparisons highlighted some of the major differences between the two spaces, as well as pointed out certain aspects that positively and negatively contribute to the users’ informal learning experience.

There are a few elements that are different between the FCCC and the Hub (i.e., power outlets and study tools). The data collected through the systematic observation sessions and previous comparisons showed that power outlets are an essential element in terms of support students’ informal learning activities. In terms of study tools, the data shows that the demand for study tools was lower than the demand for power outlets. Therefore, the lack of study tools at the Hub does not impact the user as much as the lack of a power outlet. Lack of these two features made the Hub potentially an inferior space in terms of supporting students informal learning activities.

Despite the environmental variables and other differences between these two spaces, there are also a few elements in these spaces that shared a high level of similarities, such as food and drinks, computer usages, personal belongings, and book and notes. The comparisons have revealed food and drink may not be an absolute necessary element to engage informal learning, but it can shape the café’ into the right environment, which could
boost the experience and efficiency of informal learning. Regardless of the existence of power outlets, computer usage also showed a fairly high level, the data has revealed that computers have become one of the major tools for informal learning. Neither of these two spaces offers designated storage spaces for personal belongs and the findings may potentially point to the fact that users may need storage solutions in order to make the overall space more functional and improve their personal informal learning environment as well. Lastly, as people are using computers as their primary tools, the frequency of the actions of reading books and taking notes are fairly low across the board.

Other elements vary from space to space. There are a few highlights worth mentioning. First, students tend to look into the outside environment when they have easy access, especially

**Enhanced On-campus Coffee Shop**

This section briefly recaps the most interesting findings extracted from the survey and systematic observation methodology. Ultimately, all the significant findings were considered and combined to create an enhanced on-campus coffee shop which would fully support students informal learning activities.

**Characteristics of enhanced On-campus Coffee Shop**

**Zoning**

Splitting the space into 4 zones would made the space more dynamic. Users would have the option to choose the location best suited for their activities.

**Environmental variables**

Depending on time of day or other factors, environmental variables of each zone also are relative values. The table below can be used as a reference for each variable in different zones. [EV]
Table 5. An environmental variable reference for each of the 4 zones.

<table>
<thead>
<tr>
<th>Environmental Variable</th>
<th>Private/alone</th>
<th>Public/alone</th>
<th>Public/together</th>
<th>Private/together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Level</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Noise Level</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Acoustic Privacy Level</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Visual Privacy Level</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Crowdedness</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**Food and drinks**

Food and drinks are closely related to informal learning activities and they tend to have a large impact on students informal learning experience. [FD]

**Computers and power outlets**

As computers are the main tools for students’ informal learning, the café should provide sufficient power outlets to maintain use of these devices and enable students to work here for a longer period of time. [PO]

**View Nature**

Visual interests often can serve as external stimuli in-between users’ informal learning activities to heighten their arousal and enhance their experience while in the space. [VN]

**Furniture comfort**

More seating types would increase the overall level of furniture comfort as users could choose the seat that fits them the best. [FC]

**Workspace adjustments**

Increase the types of furniture to accommodate different working styles. [WA]
Seating options
The space should provide different seating options throughout all four zones, in order to increase the flexibility of the space. [SO]

Study tools
If the space is designed to fully support students’ informal learning activities, study tools such as computer stations and printing stations should be provided. [ST]

Storage space
There are usually no designated spaces for users to store personal belongings. Personal belongings usually take up large amount of table or seating spaces. If the space is designed to fully support students’ informal learning activities, designated storage space should be provided. [SS]

Overall Design
Similar to “view nature”, the overall design can set the base tone of the space, and design features would also work as visual stimuli to help enhance students informal learning experience. [OD]

Enhanced On-campus Coffee Shop visualization
Base on the interesting findings summarized above, the next step is to incorporate these useful findings via design. The enhanced on-campus coffee shops this investigation designed demonstrates how these findings could be implemented into an actual space; however, this is certainly not the only way the space can be designed. In order to fully incorporate the investigation findings, a faux space was designed. This would allow the design to fully demonstrate each of the survey/observation’s most interesting findings.
Zoning

The four zones should be clearly identified at the beginning stage of the space planning. Figure 7 demonstrates that the whole space is divided into public zones and private zones.

Figure 7. Space zoning: the space is being divided into two main zones, public zone and private zone. A kitchen space that provide food and drink is categorized in one of the public zones, and there is also a back of house area which is not in the scope of this study.

Figure 8 demonstrates a further developed version of a zoning diagram. Each zone is expressed through undulating boxes. There are public/together blocks, public blocks, semi-public blocks, semi-private blocks, and private/together blocks, as well the micro kitchen block. The undulating blocks not only functions as a way to identify private or public, it also has the potential to serve as a visual interest as well.
Figure 8. The undulating boxes represent different zones throughout the space.

In addition to the undulating boxes, there are different types of seating options being placed in-between the blocks. Together, the blocks and the variety of seating types form the basic structure of the space (Figure 9).
Figure 9. Different types of seating options.

**Functional analysis**

One of the interesting findings revealed in the investigation is that the space should provide a variety types of the seating options in order to fit the dynamic user demands as well as increase the overall furniture comfort level of the space. Figure 10 and figure 11 provide the seating types provided in the café for both open and closed scenarios. In total, the space provides up to 10 seating options which makes space not only functional but dynamic as well.
Figure 10. Open seating options.

Figure 11. Close seating options.
**Floorplan**

Based on the zoning of the spaces, incorporated with the undulating blocks design feature and all the seating options, figure 12 demonstrates the detailed floor plan with furniture and figure 13 is the 3D isometric plan which offers a better 3-dimensional view of the space.

Figure 12. Floorplan of the enhance on-campus informal learning café.
Figure 13. Colored isometric floorplan of the enhance on-campus informal learning café.

Spatial analysis of the enhanced on-campus informal learning café

The primary goal of this study was to create an informal learning café that can support students’ informal learning activities to the maximum. In order to do so, all the findings revealed by the investigation should be reflected through the design of this space. This section analyzes the highlights of the space, which further demonstrates how the space translates the investigation findings into actual design elements. A total of eleven scenes have
been created demonstrating various aspects of the enhances on-campus informal learning café.

Figure 14 is an example of the illustration analysis. Enlarged illustration 1 shows the detailed description of specific design elements. At the end of each description, footnotes are present, which refer back to the design findings revealed in the analysis. Enlarged illustration 2 show the main space being analyzed and enlarged illustration 3 is a key plan which shows the location and perspective of the main space. The following space analysis will follow this graphic format to analyze all the key spaces.

Figure 14. Enhanced on-campus informal learning café illustration example.
Figure 15 shows the entrance of the café, which features a lounge-like seating setup. From the zoning perspective, this area is considered the public/together zone. This area offers three types of seating (lounge chairs, sofas, and ottomans) and the area is defined by a semi-transparent screen, which is also a design feature of the space. The lounge space at the entrance addresses four of the study findings, which are view nature, furniture comfort, seating options, and overall design.

Figure 15. The entrance lounge of the enhanced on-campus informal learning café.
Figure 16 demonstrates one of the public alone/together zones. The boundary between the public/alone and public/together zones in this area are blurred. The area offers a variety of seating options, which could easier accommodate both user groups. This area addresses two of the study findings, which are furniture comfort and seating options.

![Sofa Seating and Banquette Seating](image)

Figure 16. Public/alone/together zone, which offers a variety of seating options.

One of the most interesting finding of the study is that food and drinks is one of the most interesting aspects in informal learning spaces. Figure 17 shows kitchen space where people could order food and drink. On the left side of the images is the entranced lounge, which could also double as the waiting area.
Figure 17. The kitchen area within the café which offer food and drinks to the users.

Figures 18, 19, and 20 shows another public alone/together zone. This public/alone/together is differentiated from the previous one mainly by its layout and furniture selection. This area mainly uses square tables that can accommodate a group of four. When groups larger than four are present, tables can be put together to accommodate groups that have larger numbers. In addition to the customizable seating layout, the ceiling is also height adjustable, users could adjust the ceiling elements for different perceived privacy levels. On the side wall, there are also movable white boards for collaboration use. The
findings in addressed in this area are environmental variables, view nature, study tools, and seating options.

Figure 18. Public/alone/together zone with customizable furniture, and height adjustable ceiling elements.
The seating in this public together zone are consist of loose, modular furniture. A single set can accommodate 4 people. Tables can also be put together to accommodate larger group of users. [SO]

Movable white boards are offered on the wall of the public together zone. They can be used individually as smaller boards or combined together to fit the demand of a larger group. [ST]

Figure 19. The public-alone/together zone feature movable white boards to accommodate different group sizes.
Figure 20. The public/alone/together zone also offers a nice view to the outside environment.

Figure 21 shows another public/together zone, which offers a variety of seating. The seating types offered includes bar height seating, lounge chair, side chair, sofa, and bench seating. Again, this area provides a good mix of seating option for users to choose from which not only make the space more dynamic, but also accommodate different users seating preferences. The findings this area addresses are seating options and furniture comfort.
Figure 21. This public/together zone offers several types of seating, such as bar height tables, lounge set ups, as well as benches.

In Figure 22, there are two features worth pointing out. The study shows that students do not have a designated area to store their personal belongings. In this semi-private/together space, a set of lockers are attached, to provide a place for users to store their belongings. Another feature is the screen provided in the semi-private block, this would enable users to share their screen easily when working together. The findings this area addresses are study tools, storage space, and environmental variables.
Figure 22. This semi private area offers storage spaces as well as study tools for collaboration.

Figure 23 and 24 demonstrate private/together spaces in the café. This private/together zone offers complete enclosed space for even more privacy if users are seeking a quieter space to collaborate. There are two types of these spaces, one features a bar height table and the other one features regular height table. Again, more types of seating would increase the overall seating comfort. These spaces also offer screen which allow the students to share their screens easily.
Figure 23. Private/together spaces that offer complete enclosed spaces.
Figure 24. Private/together spaces feature two seating set ups, bar height and regular height tables. Study tools is also feature in this area.

Figure 25 show another semi-close space for private/together activities. These two spaces have a bit different aesthetics with other spaces but still carries the same design language throughout. On the right side of the image, study tools are being provided such as printer and computer stations, which provide better support for students informal learning.
Figure 25. Semi closed space for private/together activities, and study tools are also being provided in this area.

Figure 26 demonstrates the private/alone spaces. These spaces offer a quiet space for people who need to focus. The findings this area address is environmental variables.
Figure 26. Personal study rooms offer a quiet, enclosed space for people to focus on their work.

Figure 27 shows four high back seating along the window. The windows provide a view to the outside environment and the high back chair also provide a certain level of privacy despite the fact that the seats are placed in a more public area.
Figure 27. This public/alone area is achieved through high back chair as well as views to the exterior environment.

Figure 28 demonstrates another public/alone/together area. A variety of seating are being provided, such as lounge setups, bar height collaboration table, and bar height bench tables. This is a good mix of seating types that the users could choose which fits their activities the best, when they switch tasks, they would have the ability to change their seats easily. This area also features views to the exterior environment. The findings this area addresses are seating options, furniture comfort, and view nature.
Figure 28. This public/alone/together zone offers several types of seating, such as bar height tables, lounge set-ups, as well as bar height collaboration table.

**Summary**

In summary, the survey and observation methodology afforded an opportunity to explore many aspects in terms of students informal learning behavior, as well as filter through these finding and choosing the most relevant, and useful solution concept in a transparent and logical way. Zoning, environmental variables, food and drink, power outlets, visual interests, personal storage, and furniture selections complete the list of all necessary elements needed for a space that can support Generation Y students’ informal learning
activities. In order to better communicate the interesting findings, an enhanced on-campus informal learning café has been created and illustrated to show these different aspects would be implemented in a real space.
CHAPTER 5. DISCUSSION

Overview

This study has revealed many valuable findings through a user survey and behavior regarding how environment may impact students’ informal learning experience. In additional to the findings, this study also fully addressed these findings and created a space which maximumly supports informal learning activities.

This chapter aims to discuss the enhanced on-campus informal learning café in a way that promotes a relevant discussion regarding the study’s content and context. As a combination of dissertation and creative component, there is considerable room for subjective comment. This chapter, by discussing the most interesting findings, overall conclusion of the study and recommendation of future investigation, aims to trigger a discussion on relevant design aspects and applications that speak to designed on-campus coffee shops, Generation Y students, and the concept of informal learning.

Interesting Findings Identifies

Environmental Variables

The environmental variables are often discussed with the zoning of the spaces. Generally, an informal learning space would be split into four zones, which are private/alone, private/together, public/alone and public/together. Users would have the options to choose the locations that are best suited for their activities. The environmental variables, such as light level, noise level, privacy levels, etc. need to coincide with the characteristics of each zone.
**Food and Drinks**

The investigation from this study show that food and drinks do not have a direct correlation with informal learning activities; however, they are closely related. They tend to enhance on students informal learning experience.

**Study Tools**

The study shows the study tools offered in the observation spaced did not get a high level of usage. If the space is designed to fully support students’ informal learning activities, study tools such as computers stations and printing stations, should be provided. However, depending on the specific space, it is optional.

**Power Outlets**

As computers are the main tools for students’ informal learning, the café should provide sufficient amount of power outlet to power these devices and enable students to work here for a longer period of time.

**View Nature**

View nature can be explained as interior and exterior interest. Interior wise, it related to the overall design of the space and exterior refers to the exterior environment. When the exterior environment is plain and not interesting, the interior environment needs to be well designed and offer certain level of visual interests. Visual interests often can serve as external stimuli in-between users’ informal learning activities to heighten their arousal and enhance their experience while in the space.

**Furniture Selections**

Furniture selections relates to three of the study interesting findings, which are furniture comfort, workplace adjustment, and seating options. In terms of furniture comfort,
more seating types would the increase the overall level of furniture comfort as users could choose the seats that fits them the best. For workspace adjustments and seating options, the space should provide different seating options throughout all four zones, in order to increase the flexibility of the space.

**Storage Space**

There are usually no designated spaces for users to store users’ personal belongings. Personal belongings usually take up large amount of table or seating spaces. If the space is designed to fully support students’ informal learning activities, designated storage space should be provided.

**Conclusion**

The on-campus informal learning café design should be re-considered as an old and undynamic model that can no longer keep up with students’ demand for informal learning activities. While the informal learning cafés in this study have high utilization rate by the students, the observed time and survey results showed that their current set up and design can no longer keep up with students’ informal learning demand. Student demand more seating types, a clearer zoning system that can satisfy different learning styles, more power outlets, storage space, as well as an interesting overall design. By creating an on-campus coffee shop for students informal learning activities demonstrate what an ideal on campus informal learning café could potentially look like.

To understand how to support informal learning activities in a designed environment, we must approach the issue with a human perspective. The enhanced on-campus informal learning café this investigation designed is fundamentally a study of human behavior. By understanding how people communicate and learn, it could become possible to apply that information to future design in hope to improve or even change users’ learning experience.
Recommendations for Future Investigation

This study has undertaken a general overview of on campus café design with an eye to how the informal learning experience can be expanded and enhance. In this regard, the paper will conclude with several recommendations for future investigation directions:

1. Utilize quantitative investigation methodology with even larger sample size in hope of obtaining more accurate data to validate the interesting findings revealed in this study.

2. Research the informal learning behavior for the different target group and design a well-balance informal learning space for them.

3. Design and perform a investigation study to compare how different target groups may affect the design of the on-campus informal learning café.

4. Implement the interesting findings into an actual space to understand how the findings of the study can be implemented based on the user demands.

5. Reexamine the survey/observation results under a more control environment, which may yield different and additional results.

6. The target group for this study is mainly generation Y. In the real-world scenario, the on-campus coffee shop would not be used only by generation Y, but also user from different age groups. Study a behavior and preferences of different user groups from different generations, design a space that is suitable for a dynamic user group range, such as a combination of generation X, Y and Z.

7. User are drawing huge benefits from natural elements. For future studies, incorporation some organic natural elements in the interior design so that different
generations of students can be reconnected with, reinvigorated and inspired by nature all year round.

The subject appears to offer design researchers rich opportunities for valuable inquiry.
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APPENDIX A. IRB SURVEY APPROVAL

Date: 4/7/2017
To: Yi Yuan
4719 Mortensen Road
Unit 209
CC: Joon Suh
384 Design
Lori Brunner Stone
158 Design

From: Office for Responsible Research
Title: A Study of On Campus Coffee Shop As Informal Learning Space for Students
IRB ID: 17-164

Study Review Date: 4/7/2017

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects’ responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:
- You do not need to submit an application for annual continuing review.
- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any changes that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Human Subjects will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designee may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.
APPENDIX B.  CITI PROGRAM COMPLETION APPROVAL

Completion Date 27-Mar-2017
Expiration Date N/A
Record ID 22717780

This is to certify that:

Yi Yuan

Has completed the following CITI Program course:

- Human Research (Curriculum Group)
- Social/Behavioral Research Course (Course Learner Group)
- 1 - Basic Course (Stage)

Under requirements set by:

Iowa State University

Verify at www.citiprogram.org/verify?w2d0df1e8-d74b-4ec4-9619-e310f172d11b-22717780
# APPENDIX C. SURVEY QUESTIONS

## Enhanced On-Campus coffees shop for Informal Learning Activities

**Purpose of the survey**
The purpose of this survey is to collect data from the users of the Hub Grill & Café and Frederickson Court Community Center (FCCC) to develop different types of ideal informal learning space for on-campus cafes. These ideal informal learning types could offer suggestions for the future informal learning design in a campus cafe.

### 1. What is your age?

- [ ] Under 18  
- [ ] 18-21  
- [ ] 21-24  
- [ ] 24-27  
- [ ] 27-30  
- [ ] Older than 30

### 2. What is your gender?

- [ ] Male  
- [ ] Female

### 3. In which college(s) are you currently enrolled? (Select all that apply)

- [ ] Business  
- [ ] Human Sciences  
- [ ] Agriculture and Life Sciences  
- [ ] Liberal Arts and Sciences  
- [ ] Design  
- [ ] Veterinary Medicine  
- [ ] Engineering  
- [ ] Other

### 4. In what year of study are you currently enrolled?

- [ ] Freshman  
- [ ] Sophomore  
- [ ] Junior  
- [ ] Senior / 5th year  
- [ ] M.S., M.A., or other master's degree  
- [ ] PH.D.

### 5. How satisfied or dissatisfied are you with the overall Interior design of FCCC?

- [ ] Very dissatisfied  
- [ ] Dissatisfied  
- [ ] Neutral  
- [ ] Satisfied  
- [ ] Very Satisfied

### 6. What kind of activities do you do most in FCCC? (Select all that apply)

- [ ] Eating  
- [ ] Drinking coffee, etc.  
- [ ] Socializing  
- [ ] Non-social entertainment  
- [ ] Studying  
- [ ] Others (please specify) __________________

### 7. If you study at FCCC, what is the main reason you study here? (Select all that apply)

- [ ] Location  
- [ ] Sound level (e.g. ambient music)  
- [ ] Food and drinks  
- [ ] Less stressful  
- [ ] Good privacy level  
- [ ] Have enough necessary supplies  
- [ ] Interior atmosphere and feeling  
- [ ] N/A (I never study at the Hub)  
- [ ] Other (please specify) ____________

### 8. If you do NOT study at FCCC, what is the main reason you do not study here? (Select all that apply)

- [ ] Location  
- [ ] Distraction  
- [ ] Noise  
- [ ] Lack of privacy  
- [ ] Inadequate access to supplies  
- [ ] Interior atmosphere and feeling  
- [ ] Other (please specify) ____________

* If your answer does NOT include studying for question 6, please go to question 26.
9. When you study INDIVIDUALY, what types of activities do you do in FCCC? (Select all that apply)

☐ Homework
☐ Reading
☐ Studying for exams
☐ Writing papers
☐ Taking online classes
☐ Others (Please specify) ____________________________
☐ I never come here for individual study (Please GO to question 18)

10. How often do you usually study INDIVIDUALY at FCCC?

☐ Once a week
☐ Twice a week
☐ Three times a week
☐ More than three times a week
☐ Every day

11. How long do you usually study INDIVIDUALY at FCCC?

☐ Less than an hour
☐ 1-2 hours
☐ 2-3 hours
☐ 3-4 hours
☐ More than 5 hours

12. How satisfied or dissatisfied are you with the overall interior design of FCCC for INDIVIDUAL study?

☐ Very dissatisfied
☐ Dissatisfied
☐ Neutral
☐ Satisfied
☐ Very Satisfied

13. Do you think FCCC is overcrowded for INDIVIDUAL study?

☐ Yes
☐ No
☐ Certain times (please specify) _________________
☐ Do not really know

14. For INDIVIDUAL study, which of the following physical aspects do you like MOST about FCCC?
(Select all that apply)

☐ Location
☐ Availability of food and drinks
☐ Interior colors
☐ Lighting
☐ Furniture type
☐ Furniture arrangement
☐ Interior design and atmosphere
☐ Having enough personal space
☐ Other (please specify) _________________

15. For INDIVIDUAL study, which of the following physical aspects do you like LEAST about FCCC?
(Select all that apply)

☐ Location
☐ Availability of food and drinks
☐ Interior colors
☐ Lighting
☐ Furniture type
☐ Furniture arrangement
☐ Interior design and atmosphere
☐ Lack of personal space
☐ Other (please specify) _________________

16. For INDIVIDUAL study, how satisfied or dissatisfied are you with the following elements in FCCC?

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<th>Neutral</th>
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<td>Furniture type</td>
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<tr>
<td>Furniture arrangement</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Seating options</td>
<td>Very dissatisfied</td>
<td>Dissatisfied</td>
<td>Neutral</td>
<td>Satisfied</td>
<td>Very Satisfied</td>
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<tr>
<td>Visual privacy</td>
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<tr>
<td>Acoustic privacy</td>
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<tr>
<td>Internet access</td>
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<tr>
<td>Access to electrical power</td>
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<tr>
<td>Size of windows</td>
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<tr>
<td>Overall aesthetics</td>
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<tr>
<td>Location</td>
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</tr>
</tbody>
</table>

17. For INDIVIDUAL study, which area is your favorite spot in FCCC? (Please circle it)

18. When you study in a GROUP, what types of activities do you do in FCCC? (Select all that apply)

- Discussing group project(s)
- Sitting together but working individually
- Tutoring
- Other (please specify) __________________________
- I never come here for group work (Please GO to questions 26)

19. What is the typical size of the GROUP?

- Group of two
- Group of three
- Group of four
- Group of five
- Group of six or larger

20. When you study in a GROUP, how often do you usually visit FCCC?

- Once a week
- Twice a week
- Three times a week
- More than three times a week
- Every day
21. When you study in a GROUP, how long do you usually stay in FCCC?

- Less than an hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- More than 5 hours

22. How satisfied or dissatisfied are you with the overall interior design of FCCC for GROUP work?

- Very dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very Satisfied

23. Do you think FCCC is overcrowded for GROUP study?

- Yes
- No
- Certain times (please specify) ________________
- Do not really know

24. For GROUP work, which of the following physical aspects do you like MOST about FCCC? (Select all that apply)

- Location
- Availability of food and drinks
- Interior colors
- Lighting
- Furniture type
- Furniture arrangement
- Interior design and atmosphere
- Having enough personal space
- Other (please specify) ________

25. For GROUP work, which of the following physical aspects do you like LEAST about FCCC? (Select all that apply)

- Location
- Availability of food and drinks
- Interior colors
- Lighting
- Furniture type
- Furniture arrangement
- Interior design and atmosphere
- Lack of personal space
- Other (please specify) ________

26. For GROUP work, which area is your favorite spot in FCCC? (Please circle it)
27. For GROUP work, how satisfied or dissatisfied are you with the following elements in FCCC?

<table>
<thead>
<tr>
<th>Element</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Furniture type</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Furniture arrangement</td>
<td></td>
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<tr>
<td>Seating options</td>
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<tr>
<td>Visual privacy</td>
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<tr>
<td>Acoustic privacy</td>
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<td></td>
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<tr>
<td>Internet access</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Access to electrical power</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Size of windows</td>
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<tr>
<td>Overall aesthetics</td>
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<tr>
<td>Location</td>
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</tbody>
</table>

Questions below are related to the ideal informal learning space in a campus café from your own perspective.

28. How satisfied or dissatisfied would you be in the following seating areas in your IDEAL informal learning space in a campus café for INDIVIDUAL study?

<table>
<thead>
<tr>
<th>Seating Area</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit by the window</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit along the wall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit somewhere in the middle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit close to the entrance</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

29. What types of privacy do you demand for your IDEAL INDIVIDUAL study activities? (Select all that apply)

- Visual privacy
- Physical privacy (e.g. enclose/semi-enclosed space)
- Acoustic privacy (e.g. noise level)
- Others (please specify)

30. How satisfied or dissatisfied would you be in the following seating areas in your IDEAL informal learning space in a campus café for GROUP work?

<table>
<thead>
<tr>
<th>Seating Area</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit by the window</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit along the wall</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sit somewhere in the middle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit close to the entrance</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

31. What types of privacy do you demand for your IDEAL GROUP work activities? (Select all that apply)

- Visual privacy
- Physical privacy (e.g. enclose/semi-enclosed space)
- Acoustic privacy (e.g. noise level)
- Others (please specify)
32. How important or unimportant do you think the following elements in your IDEAL informal learning space in a campus café are?

<table>
<thead>
<tr>
<th>Element</th>
<th>Not at all important</th>
<th>Slightly important</th>
<th>Important</th>
<th>Fairly important</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movable furniture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustable tables &amp; chairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customizable task lighting</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Customizable privacy</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Seating options</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large windows</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Easy to get the study tools</td>
<td></td>
<td></td>
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<tr>
<td>Easy access to internet</td>
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</tr>
<tr>
<td>Natural elements (e.g. plants, view to nature)</td>
<td></td>
<td></td>
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<tr>
<td>Easy access to power</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Accessible location</td>
<td></td>
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<td></td>
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<tr>
<td>Food</td>
<td></td>
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<tr>
<td>Drinks</td>
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<td></td>
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<tr>
<td>Overall aesthetics</td>
<td></td>
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</tbody>
</table>

33. Please select the following keywords that you think describe your IDEAL informal learning environment in a campus café.

- Naturally lit
- Modern
- Clean & Fresh
- Polished
- Spacious
- Traditional
- Luxurious & decorative
- Fashionable
- Low stressful
- Bright
- Simple
- Open
- Light ambient noise (e.g. music)
- Dark
- Quiet
- Cute
- Substantial ambient noise
- Colorful
- Dynamic
- Romantic

34. Besides all the aspects mention earlier in the survey, do you have any additional comments regarding your IDEAL informal learning environment in a campus café?
APPENDIX D. SYSTEMATIC OBSERVATION CHECKLIST

FREDERICKSEN COURT COMMUNITY CENTER/ THE HUB
Systematic observation

Date:

Learning Space Type
- Private Alone
- Private Together
- Public Alone
- Public Together

Light Level ___ 1 ___ 2 ___ 3 ___ 4 ___ 5
Noise Level ___ 1 ___ 2 ___ 3 ___ 4 ___ 5
Acoustic Privacy Level ___ 1 ___ 2 ___ 3 ___ 4 ___ 5
Visual Privacy ___ 1 ___ 2 ___ 3 ___ 4 ___ 5
Crowdedness Level ___ 1 ___ 2 ___ 3 ___ 4 ___ 5

Action Count

Food and Drinks
- Food ____________
- Drink ____________

Computer Usage
- Typing ____________
- Watching ____________
- Reading ____________
- Others ____________

Power Outlet
- Looking for Power Outlet ____________
- Using Power Outlet ____________

Study Tools
- Use public paper/pen
- Use public printers
- User public computers

View Nature
- Looking outside the window
- Look into the interior space
- Looking at something interesting in the space

Furniture Comfort
- Adjusting table
- Adjusting chair
- Changing Posture

Working Space Adjustments
- Rearrange study tools
- Moving computer
- Moving books
- Cleaning table
- Taking out study tools

Personal Belonging Storage
- Putting bags on the chair/table
- Putting clothes on the chair/table
- Move furniture to store bags or clothes

Books and Notes
- Reading books
- Reading papers
- Reading Notes
- Taking notes

Seating Options
- Change chair
- Change table
- Change seating location
APPENDIX E. ENHANCED ON CAMPUS COFFEE SHOP RENDERINGS

Figure E1. Public Together Zone
Figure E2. Public Together / Public Alone Zone
Figure E3. Micro Kitchen
Figure E4. Public Together Zone
Figure E5. Public Together Zone
Figure E6. Semi Private Together Zone and Storage Space
Figure E7. Private Alone / Together Zone
Figure E8. Private Together Zone and Study Tools
Figure E9. Private Alone Zone
Figure E10. Semi Private Alone Zone
Figure E11. Public Together / Alone Zone