COLLEGE STUDENTS' CHOICE OF INFORMAL LEARNING SPACES

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hereby certify that, in their opinion, it is worthy of acceptance.

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The wide adoption of mobile technologies in education has made it possible to turn every common space in a higher education campus into a learning place. Libraries, student commons, lounges, or even corridors are all now potential places to learn. Having so many places to choose from, current college students - many of whom belong to the Net Generation - have the luxury of selecting the ones that best match their learning styles and needs.

This research study focuses on the relationship between current college students and informal learning spaces, specifically the college students' choice of informal learning spaces. Adopting Lewin's (1951) formula of human-environment relationship in which behavior is the result of the interaction between person and environment, this study further examines the relationship between current college students and informal learning spaces in higher education campuses. Specifically, the study investigates factors that contributed to students' choice of campus informal learning spaces.

Data were collected through observations at ten informal learning sites (two libraries, two student centers, two residence halls, and four academic halls) in a Midwestern university and 54 interviews with students, professors, campus facility planners, designers, and administrators.
Using grounded theory, a model to illustrate the ways current college students chose informal learning spaces was developed from the data. The findings showed that current college students adopted a unique relationship with the physical environment as they chose informal learning spaces on campus to study. There were many factors affecting their choice of informal learning places including their preference to balance academic success and social success, the nature of the learning tasks, the environmental factors (setting, noise, crowding, lighting, furniture, amenities, and location), and the facility management factors (accessibility and control). They preferred private zones inside these social facilities such as study booths, study rooms, study nooks, or even corridors rather than places with extreme privacy or sociability. Adjustments of place selection were found to base on the situations, their needs, and the students' ability to adjust to the distractions within the informal learning spaces.

The study contributes to the literature about the Net Generation and their choice of informal learning spaces. The findings helped teachers, administrators, parents, and designers to understand more about current college students and their learning spaces. Campus facility planners, educational designers, and campus administrators in particular can now refer to the factors influencing students' choice of informal learning spaces identified in this study to design compatible informal learning spaces for current college students.

**Keywords:** informal learning spaces, learning environment, place choice, Net Gen, college students, environmental factors
“There is a sense of anticipation in higher education technology circles these days, a feeling of prickly excitement that hasn’t been experienced since the early days of the dot-com boom…the mobile revolution is finally here” (Wagner, 2005, p.40).

The Internet has made significant changes to students' learning behaviors and use of campus spaces, especially informal campus spaces. Being able to access information on the Internet from almost anywhere, students have gravitated towards new learning spaces such as information commons, dining areas, lounges, patios, pathways, and other gathering spots (Alexander, 2004). In these informal spaces, students may share a pizza while discussing studies and social activities, facilitate a group study session (Painter et al., 2013), meet with peers by chance over study-related issues or simply enjoy “being there” in the studying community on campus (Crook & Mitchell, 2012).

Given that these campus spaces have been used for both social and learning activities, they are called informal learning spaces (Oblinger, 2006; Painter et al., 2013; Whiteside, Brooks, & Walker, 2010). These informal learning spaces have become the favorite spaces to study for many of today's college students (Alexander, 2004). Many of them even consider the availability of informal learning spaces as one criterion for
choosing colleges (Price, Matzdorf, Smith, & Agahi, 2003). They even refuse to study in alternative locations even though they know that the current informal learning spaces might not be optimal for their learning goals (Whiteside et al., 2010).

In response to the interest in informal learning spaces, campus facility planners and administrators at many higher education institutions have attempted to make informal spaces more conducive to learning. Educational amenities (desks, tables, carrels, whiteboards, booths, outlets, et cetera) are recommended in many informal spaces to facilitate students' learning needs (MacPhee, 2009; Painter et al., 2013). Traditional learning spaces outside the classrooms, such as information centers in libraries have been remodeled to enable college students to socialize with peers and to receive academic help at the same time (Bailey, 2005; Schmidt & Kaufman, 2005). Many gathering spots and points of dispersal have also been built into circulation spaces on campuses to support chance encounters and social exchange among students (Acker & Miller, 2005).

Although some faculties are receptive to the idea of informal learning spaces, many fear that traditional learning spaces - especially the libraries - might turn into undergraduate circuses (Bowler, MacMillan, Hicks, & Graber, 2010). Nonetheless, proponents of informal learning spaces have very little empirical information available to persuade the opponents. Although research on environment-behavior has acknowledged that environmental factors such as loud noise, poor lighting, and over-crowding et cetera could negatively impact students' performance and mood in classroom settings (Gifford, 1987; Weinstein, 1979), there is not enough information available to understand how these environmental factors affect learning in informal learning spaces.

In addition, today's young people are so influenced by the Internet that they are
given the name “Net Gen” (Tapscott, 2008). They tend to multi-task and have preferences for freedom of choice, customization, entertainment, and collaboration et cetera (Carlson, 2005; Prensky & Berry, 2001; Tapscott, 2008). They are interested in informal learning spaces (Alexander, 2004; Price et al., 2003; Tapscott, 2008), and favor spaces that support comfort and social encounters (Acker & Miller, 2005; Painter et al., 2013). However, there is no persuasive research model that is capable of explaining why students are attracted to informal learning spaces.

While the Internet is considered as the primary reason for a heightened interest in informal learning spaces (Alexander, 2004; Hlodan, 2010), it does not fully explain why Net Gen students prefer certain WiFi-enabled informal learning spaces. Given that environmental factors affect individual performance and mood (Gifford, 1987; Weinstein, 1979), it is possible that environmental factors contribute to students' choice of informal learning spaces. Only by understanding the factors that influence students' choice of informal learning spaces, may we understand more about the roles of the physical environment in student learning and thus be able to design learning activities and learning spaces to satisfy students' needs.

Given the gap in the literature about the reasons behind today's college students' attraction to certain informal learning spaces and given that environmental factors other than Internet availability may have an impact on their choice of informal learning spaces, the current study was conducted to explore factors underlying current college students’ choice of informal learning space. Specifically, the study focused on the ways current college students perceive, evaluate, and interact with environmental factors in their choice of informal learning spaces. Considering the study aimed to explore the deeper
thoughts of students in their decision to choose informal learning spaces, I approached the study from a qualitative perspective, using grounded theory to guide my findings about underlying factors. Based on common themes provided by the students in my study, I created a model to explain the roles of environmental factors in their decision to choose informal learning spaces. I hope that the findings help researchers, educators, campus planners, and educational designers understand more about the relationship between today's college students and informal learning spaces, and that the findings provide useful information that can be utilized to create compatible environments for current learning.
CHAPTER ONE: REVIEW OF THE LITERATURE

Chapter introduction

The way students relate to informal learning spaces is a part of the large knowledge about the relationship between humans and their surrounding environments. The background of this research, therefore, includes the basic understanding about the human-environment relationship.

Contemporary environment-behavior researchers have attributed their foundation to Lewin's (1951) field theory to build the relationship between the human and their surrounding environments (Binning, Lebreton, & Adorno, 2006). Lewin (1951) suggested a formula for the relationship between a person and his environment known as $B=f(P, E)$, or behavior (B) is the result of interaction between a person (P) and his environment (E). According to Lewin (1951), every person is a complex entity that could only be understood within the wider physical, social, economic, and political context. Similarly, the environment is not the objective physical environment but the one that has been processed through a personal viewpoint.

In an education context, three interacting forces – the student, the instructor, and the learning environment- need to be in balance to result in effective learning (Schuetz, 2005). With this in mind, the literature review chapter is organized into three sections,
covering essential knowledge about the person factor (the Net Gen college students), the learning factor (learning mechanism and current learning paradigms), and the environmental factor (the relationship between physical environment and learning).

1.1. Net Gen college students

The term Net Gen suggests a generation of young people who are different from the previous generation because of their exposure to the Internet as part of their youth (Carlson, 2005, Jones & Ramanau, 2009; Oblinger & Oblinger, 2005; Tapscott, 2008).

There have been many different opinions about the age of the Net Generation. Carlson (2005) used the term the Net Gen or Millennials for people who were born roughly between 1980 and 1994. Jones, Ramanau, Cross and Healing (2010) selected the year 1983 as the mark for the first generation of the Net Gen. Oblinger (2006) defined the Net Gen as those who were born in the 1980s and later. Tapscott (2008) classified those who were born between 1977 and 1997 as Net Gen (or the Millennials or Generation Y), and those who were born from 1988 to present as Generation Next.

Despite the slight difference in age range of the Net Gen, these young people share the same characteristic of being influenced heavily by technology and the Internet. Taking into the consideration that the Internet began in early 1980s, this study considers any young people who were born after the year of 1980 to be the Net Gen.

Technology has influenced the life of the Net Gen in various ways: they are technology savvy, like to multitask, and expect to control what, when, and how they learn (Carlson, 2005).

According to a Pearson Student Mobile Device Survey conducted in 2014, college
students felt a strong need to connect to the Internet to complete schoolwork in different locations (Poll, 2014). Specifically, the report indicated that 67% of college students felt the need to be connected to the Internet every day at home, 64% when they were at school, and 15% when they were on their ways to school (Poll, 2014).

Indeed, the Internet has become indispensable to students' daily activities (Alexander, 2004). It is common for a college student to “google a professor’s term, upload a comment to a class board, and check for updates to today’s third assignment, all while striding across the quad” (Alexander, 2004, p.62). Students have been so attached to the Internet that it is very hard for them to give up either the Internet (53%) or their cell phones (49%) (Center, 2014).

To reduce the dependency on the Internet, there have been campaigns for “digital detoxing” or “unplugging” aimed at making people more grounded in real life (Morrison & Gomez, 2014). It was reported that for the 4th Unplug movement, about 2,000 people signed up for the digital detox in the San Francisco area (Bhattacharjee, 2014). Clearly, the Internet has been an indispensable part of today's college students’ life and it may have an impact on their daily behaviors, including their choices of informal learning spaces.

The impacts of the Internet on the Net Gen's learning abilities and preferences have been widely reported by various researchers (e.g., Carlson, 2005; Oblinger, 2006; Prensky & Berry, 2001; Tapscott, 2008). Researchers have claimed that exposure to the Internet and digital game at a young age has enabled the Net Gen to process information differently (Prensky, 2003). Not only can they process a greater amount of information faster (Prensky & Berry, 2001), they can also process information in a non-linear fashion,
leaping from one piece of information to another as if their cognitive structures are parallel (Prensky & Berry, 2001; Oblinger & Oblinger, 2005). Researchers have postulated that this non-linear way of processing information resulted from frequent usage of Internet hyperlinks, thus naming it “hypertext mind” to reflect the connection to the Internet (Prensky & Berry, 2001; Oblinger & Oblinger, 2005). Typical “hypertext mind” students read information by moving their eyes around the screen, following hyperlinks and leaping from one item of information to another instead of following the instructions step by step (Tapscott, 2008). The Net Gen's way of processing information may have an influence on the way they process physical environment elements, and thus may influence their choices of informal learning spaces.

Additionally, the Net Gen is also well-known for their ability to multitask (Carrier, Cheever, Rosen, Benitez, & Chang, 2009; Tapscott, 2008). They can do homework while listening to music, watching television, regularly checking text messages, talking with friends, laughing, and eating, (Tapscott, 2008). However, research has shown that the quality of doing two things at once is dependent on the types of tasks (Carrier et al., 2009; Fried, 2008; Tapscott, 2008). Specifically, task combination was found more likely to happen between listening to music and other activities (surfing the web, e-mailing, instant messaging, talking on the telephone, texting, etc.) and less likely to happen when the person performed leisure reading (Carrier et al., 2009). When tasks tap into the same channel of the brain, it is more likely that the multi-taskers have to slow down or risk making more mistakes (Tapscott, 2008). Researchers have found that when performing a difficult task such as reading comprehension, participants who spent time on instant message (IM) reported lower reading scores and lower self-reported GPAs
Similarly, using a laptop while sitting in a classroom lecture, an activity that often performed by the Net Gen, could negatively impact one’s understanding of the lecture materials (Fried, 2008).

Levine, Waite, & Bowman (2007) suggested that repeated engagement in tasks that require frequent attention shifts could lead to a preference for frequent task-switching over sustained attention during cognitive tasks. Habitual multi-tasking may also condition Net Gen students’ brains to an overexcited state, making it difficult for them to stay focused (Wallis, 2006). That may be why, when learning with plain texts, the Net Gen performed much worse than when learning with interactive visual images (Roos, 2007). Additionally, that may be the reason for the Net Gen's poor attention span (Carlson, 2005; Prensky, 2003; Tapscott, 2008). Because the Net Gen prefers frequent task-switching over sustained attention during cognitive tasks (Levin et al., 2007), they may prefer the physical environments that allow them to switch their attention frequently.

Furthermore, the Internet also shapes the Net Gen preferences for freedom of choice, customization, collaboration, and entertainment (Tapscott, 2008).

1. Freedom of choice: The Net Gen wants freedom in everything (Tapscott, 2008). When it comes to schoolwork, they would like to decide what to learn, or at least what part of the required course to learn (Tapscott, 2008). When it comes to workplace, they would rather use technology to escape the traditional working space (Tapscott, 2008). It is quite easy for them to do this, as the Internet enables them to access information from almost anywhere and in almost any environment. Thus, their alternative learning destinations are the music rooms, the lounges, tutor rooms, coffee shops, etc. (Collis, 2010; Hunter & Cox, 2014; Seaman, 2005). However, the benefit of learning in a
social setting was questionable, as not much learning actually occurred in informal learning spaces (Arum & Roksa, 2011). As Net Gen students enjoy and demand freedom of choice, especially the choice of learning places, they may consider freedom of usage as a selection criterion when choosing informal learning spaces after class hours.

2. Customization: Under the influence of freedom of choice, the Net Gen enjoys customizing or changing everything to fit individual needs (Tapscott, 2008). They want their faculty to provide a customized learning experience (Bajt, 2011) and expect to have flexible work schedules and duties (Martin, 2005). Perhaps their love for personalization affects their choices of informal learning spaces.

3. Collaboration: Being trained to learn together at a young age, the Net Gen likes to collaborate and is good at doing so (Oblinger, Oblinger, & Lippincott, 2005). The Internet brings an additional advantage of providing a medium to collaborate across distances. The collaborators could be at home, on the beach, or anywhere and still communicate with their peers and instructors (Alexander, 2004). Indeed, they collaborate and influence each other in various aspects of life through online comments and opinions (Tapscott, 2008). However, they prefer collaborating online to collaborating face-to-face (Turkle, 2012). They enjoy being “alone together”, or would rather sit together in social places without communication or interaction with each other (Turkle, 2012). In other words, they enjoy “being there” as participants in the studying community (Crook & Mitchell, 2012). Perhaps their preference for alone together has an impact on the informal learning spaces they choose.

4. Entertainment: Being exposed to digital gaming as part of their maturing years, the Net Gen likes to be diverted all the time. They want entertainment in every aspect of
life from work to education to social life (Tapscott, 2008). Growing up with interactivity, they become bored easily (Roos, 2007). To combine entertainment and learning, teachers and educators have been designing various serious games, which combine instructional and game elements to motivate and influence student learning (Charsky, 2010). Perhaps, entertainment may play a role in their choices of informal learning spaces.

In summary, the Net Gen's hypertext minds, their ability to multitask, and their preference for freedom of choice, customization, collaboration, and entertainment may affect the way they perceive environmental factors, and thus affect their choice of spaces to study outside the classroom. It is relevant to note that these are postulations drawn from the literature about the Net Gen. These postulations are not grounded in empirical evidence, as the research on the impact of environmental factors on the Net Gen’s choices of informal spaces is lacking. Only by investigating factors underlying the Net Gen’s decision to choose informal places to study, can one understand more about how all the special characteristics of the Net Gen influence their interaction with the physical environment and how their perceptions of environmental factors influence their choices of informal learning spaces.

1.2. Learning

Cognition and learning are two central concepts in education psychology. Learning is the permanent changes in behaviors or in mental association due to experience (Ormrod, 2014). Cognition, however, is the various ways in which people think about what they see, hear, study, and learn (Ormrod, 2014). Cognitive processes are the specific things that people do to acquire knowledge and these processes have a
significant influence on what are being learnt and how well they are stored in the memory
(Ormrod, 2014).

1.2.1. Learning mechanism

1.2.1.1. Information processing model

The dominant theory about memory is based on the work of Atkinson and Shiffrin (1968). The authors proposed that information is processed and stored in three stages: sensory memory, short-term memory, and long-term memory. Huitt (2003) interpreted the information process approach to cognition as below.

In the sensory stage, anything in the surrounding environment can be input information, such as light, sound, smell, heat, and noise. The body transfers the information processed by the brain into the next stage. In short-term memory, or working memory stage, the brain pays attention to external stimuli or internal thought and recalls previously stored information to understand the new inputs. A piece of information could be further encoded in the long-term memory if it is relatively easy to recall. Because learning is considered permanent changes of behaviors or mental association, the quality of learning is determined by whether the information is stored in the long-term memory and can be easily retrieved when needed or not (Ormrod & Davis, 2004).

1.2.1.2. Attention

Attention occurs when there are one or more stimuli available to process. Research has shown that serial bottlenecks in information processing can affect the abilities to process multiple things at the same time (Anderson, 2005). According to Anderson (2005), when facing a bottleneck, our cognitive processes select pieces of
information to attend to while ignoring others. In other words, attention systems
determine the information to process when it is not possible to process various
information concurrently.

Some teachers claim the Net Gen has an attention deficit problem. They reported
current students were unable to pay attention to lessons for a certain period of time
(Prensky & Berry, 2001; Tapscott, 2008). However, Tapscott (2008) argued that the Net
Gen's attentional ability is normal and they just do not want to listen to boring lectures. It
seems the Net Gen is able to selectively direct their attention to what they want to learn.

In an article that advised educators on how to deal with Net Gen college students,
Carlson (2005) suggested educators need to learn to accept divided attention spans, a way
of attending to information most current college students have developed as they interact
with the Internet. Divided attention occurs when students are able to pay attention to
several pieces of information at the same time (Craik, Govoni, Naveh-Benjamin, &
Anderson, 1996). According to these researchers, divided attention has different impacts
depending on the stage of information processing. They found that divided attention
reduce memory performance at encoding rather than retrieval. Additionally, changes in
emphasis instructions have profound effects on memory at encoding but not at retrieval.
The authors suggested some degrees of parallel processing at retrieval may be possible
but none at encoding.

Despite unsupported findings concerning the usage of divided attention in
learning, current students enjoy to process multiple information at the same time. They
love multi-tasking and seem to be experienced in it (Carrier et al., 2009; Tapscott, 2008).
Some researchers even claim the Net Gen develop hypertext minds, or the ability to leap
from one cognitive structure to another (Oblinger & Oblinger, 2005). The Net Gen is able to switch attention from one task to another at high speed as they follow the quickly-rendered information presented with the click of hyperlinks (Tapscott, 2008). If so, it seems the Net Gen is able to ping-pong attentional resources so they could have the ability to process the selected information when facing bottleneck.

Given that anything in the physical environment (light, sound, smell, heat, noise, etc.) could enter the coding process as students try to encode learning materials, how Net Gen students process environmental factors as they encode and retrieve information could be an interesting topic to further research.

1.2.1.3. Theory of flow

Flow is a mental state in which people perform their best. The theory of flow was named by Csikszentmihalyi (1992) as he identified that in order to enter an optimal zone of performance, there needs to be a balance between challenges and the ability to handle them. When disrupted, the imbalance of challenge and ability could lead to apathy (i.e., low challenges, low skills), anxiety (i.e., high challenges, low skills), or relaxation (i.e., low challenges, high skills) (Csikszentmihalyi, 1992).

Shernoff, Csikszentmihalyi, Shneider, and Shernoff (2003) examined the effects flow theory on engagement and reported that participants experienced increased engagement when they perceived the balance between the challenge of the task and their own skills, especially when their skills were higher than the challenge. Participants were also more engaged in individual and group work as opposed to lectures, watching videos, or taking exams.
In a study about music learning, Custodero (2002) reported the relationship between flow experience and learning became clear when the nature of cognition as intellectual change was taken into consideration. The authors indicated music learners faced with the task of keeping the challenges matched their increasing skills. In other words, leaners had to find the way to make music learning activities more complex to maintain their interest in learning.

Considering the Net Gen's interest in multi-tasking and divided attention under the light of the theory of flow, it comes to question whether the amounts of stimuli being processed at one moment in the Net Gen's brain have any relationship with their needs to seek for challenges. Considering environmental factors could enter the brain as stimuli during encoding or retrieval, it is important to understand how environmental factors relate to the attempt to balance abilities and challenges in order to maintain the state of flow in learning and how this affects the choice of informal learning spaces.

1.2.2. Current learning paradigms

Development in the knowledge of human learning has slowly changed the way universities design and conduct educational programs. Even though formal learning, also known as classroom learning, is still popular in universities, many higher education institutions have realized that knowledge could not be effectively delivered to students but rather constructed by individuals (Jamieson, 2009). A more student-centered approach to teaching and learning has been gradually applied in higher education. Student-centered learning focuses on developing learners' autonomy and independence (Jones, 2007) which enable them to be lifelong learners and independent problem solvers (Young &
Rooting from the student-centered paradigm, active learning, social learning, collaborative learning, informal learning all play an important role in teaching and learning in higher education.

1.2.2.1. Active learning

Being promoted by educators since the 1980s and popularized in the 1990s through a report of the Association for the Study of Higher Education (ASHE), active learning is a learning model in which students actively involve and engage in the learning process (Bonwell & Eison, 1991). According to ASHE's report, active learning requires more than instructors' presentations in formal classrooms. Citing the literature, the report emphasized that for active learning to occur, students “must read, write, discuss, or be engaged in solving problems,...higher-order thinking tasks as analysis, synthesis, and evaluation” (p.5).

Active learning can be encouraged both inside and outside the classroom (Chickering & Gamson, 1987). Inside the classroom, teachers may employ structured exercises, challenging discussion, team projects, and peer critiques (Chickering & Gamson, 1987). Outside the classroom, students can learn by taking internships, doing independent study, participating in cooperative job programs or helping design and teach parts of courses (Chickering & Gamson, 1987).

Roehl, Reddy, & Shannon (2013) suggested that to engage Millennial or Net Gen students, active learning strategies could be applied through the flipped classroom model. Their reasons were:
1. In a flipped classroom model, students are required to view the lecture content at home and utilize time in class to work on problems, advance concepts, and collaborative activities.

2. Students are given the freedom to interact with the content in their own learning styles: they can replay the recorded lectures several times or progress with the course even when the teacher is absent.

3. Students become more aware of their own learning process and progress

The promotion of the flipped classroom model in recent years could play a role in the increase use of informal campus spaces for learning activities. As students could access learning materials from anywhere and need to complete them before the class time, they may choose to digest those materials at their convenience, whether when they are waiting, hanging out with friends, or running errands, et cetera.

1.2.2.2. Collaborative learning

Rooted in Vygotsky's theory of zone of proximal development, collaborative learning shows that learners can do better with help from others (Lee & Smagorinsky, 2000). Collaborative learning is commonly used to describe a group of students working together to understand a concept, to develop an artifact, or to find a solution. Collaborative learning as a pedagogy involves the grouping of students to work together in or out of class (Panitz & Panitz, 1998). In class, teachers could organize learning activities in which students are required to work in team or group. Out side the classroom, students may continue to collaborate as part of the group project assigned by their teachers or voluntarily work together to help each other in completing class projects.
However, collaborative learning is not as easy as putting several students together. The quality of group work depends on the way the group is organized, nature of the tasks, participants, and the way the group is held accountable (Blumenfeld, Marx, Soloway, & Krajcik, 1996). One of the collaborative learning strategies collected by Panitz & Panitz (1998) is to ask students to do homework assignments together and present their group results in class. This collaborative technique is probably one of the most common collaborative activities conducted by teachers. As the result, students nowadays tend to work more in group outside the classroom. As they are given the flexibility to choose the location for the out-of-class group activities, they may meet at one of the informal learning spaces on campus.

1.2.2.3. Informal learning

Informal learning is often defined in contrast with formal and non-formal learning. According to Schugurensky, (2000), formal learning refers to educational ladders from preschool to graduate studies. Informal learning, however, is not institutional or involve a prescribed curriculum. In other words, informal learning does not require a teacher, an award of qualification, or a structured framework. Non-formal learning, by contrast, has a designated teacher, a prescribed curriculum, and award of qualification, but does not require prerequisite courses like formal learning (Schugurensky, 2000). For example, in higher education context, a student could experience all three types of learning: formal learning in the classroom, informal learning with tutors and friends, and non-formal learning with an organization for certifications.

However, it should be noticed that authors may define informal learning
differently depending on their goals. Because this study focuses on the spatial aspect of informal learning, it adopts the definition of informal learning from an article about informal learning space by Jamieson (2009). Hereafter, informal learning is defined as course-related activity undertaken individually and collaboratively on campus that occurs outside the classroom and does not directly involve the classroom teacher (Jamieson, 2009). Informal learning activities may include course reading, class preparation, assignments, project activities, and activities students do to learn between formal classes (Jamieson, 2009).

With the help of technology, any space outside the classroom could be turned into an informal learning space (Brown, 2005). Nevertheless, in a campus setting, informal learning takes place in the library, the student refectory, cafes, and other social spaces (Jamieson, 2009). Because this study focused on informal learning spaces in campus setting, it attended to informal learning spaces on campus as suggested above by Jamieson (2009).

1.2.2.4. Social learning

The traditional approach to social learning posits that social motivations play an important role in learning (Miller & Dollard, 1941). Two people are evoked and connected to appropriate cues, a process called “matched-dependent behavior” (Miller & Dollard, 1941. This identifies the leader and the follower in the process of social learning, indicating that the leader not the follower is able to read the relevant environmental cue. Bandura (1977) further developed social learning theory which posits that learning takes place in a social context and can occur purely through observation or direct instruction.
Recent expansion of social learning has considered the impacts of the Internet and technology (Brown & Adler, 2008). The author pointed out two important points about social learning in the age of technology: 1) The Internet has provided a sophisticated participatory medium to support sharing and multiple modes of learning whether it is non-formal or informal learning; 2) People tend to offer access to other by providing access to information. The definition of social learning, as the result, has shifted from learning as knowledge delivery to learning as knowledge constructed through conversation with others (Brown & Adler, 2008). In other words, the new definition of learning focuses on the “how” instead of the “what” in learning.

In a similar way, Bingham & Conner (2010) opined that the new perception of social learning heavily weighs the role of social media. They wrote that “to learn is to optimize the quality of one’s networks. Learning is social. Most learning is collaborative. Other people are providing the context and the need, even if they’re not in the room” (p.21). The new social learning centers on information sharing, collaboration, and co-creation (Bingham & Conner, 2010).

The new perception of social learning is widely adopted by the Net Gen as they love to influence each other's opinions through online comments (Tapscott, 2008). Even though, in terms of learning together in informal learning spaces, there is not much information available to determine whether students are influencing each other's knowledge as they study together in informal setting. A study has pointed out that not much learning actually takes place in social facilities (Arum & Roksa, 2011), however, it is unknown whether this conclusion is applicable across all social facilities and all types of learning. Given that current college students' interest in social facility is increasing
(Alexander, 2004; Price et al., 2003), more research is needed to understand how learning, especially social learning take place in informal learning spaces, and how current college students find value in studying in these spaces.

In summary, recent movements in education such as active learning, collaborative learning, informal learning, and social learning might influence the interest in informal learning spaces of current college students. Further research is needed to understand how students value informal learning spaces, and how these spaces could be utilized to the benefit of learning outside the classroom.

1.3. The relationship between students and learning environment

1.3.1. Environment-behavior perspectives

Based on Lewin's (1951) field theory, many researchers have expanded the understanding of interactions between humans and the surrounding environment. Environmental behavior theorists have conceptualized human interaction with the environment through several perspectives including, but not limiting to, arousal, behavioral, and environmental stress approaches.

1.3.1.1. Arousal perspective

According to Yerkes-Dodson law, performance is at a maximum while at intermediate levels of arousal (Yerkes & Dodson, 1908). In other words, performance progresses in an inverted U-shape as people become more alert or excited. The roles of arousal from an environmental perspective were noted in many studies that deal with environmental factors such as noise and crowding. Poulton (1976) reviewed various research studies and showed that heat, noise, and vibration may improve performance
rather than degrade it. Poulton (1976) suggested that the ideal working environment for certain tasks may need some form of stress to heighten performance. In another study, Geen (1984) reported learning was best when participants (introverts and extroverts) were stimulated by the level of noise either they or members of the same personality conclusion chose. A more recent study by Küller, Mikellides, & Janssens (2009) suggested a moderate use of good color design improves the overall mood and well-being of people. Specifically, strong colors, especially red, and patterns put the brain into a more excited state which may slow down the heart rate. Introverts and those already in a negative mood were more affected than others, which caused severe negative changes in their performance.

Because under arousal approach, some levels of environmental distractions may benefit the learning performance, this study speculates that when choosing informal learning spaces, college students may consider the availability of certain arousing environmental features to help them heighten their learning performances.

1.3.1.2. Behavioral constraint perspective

Behavioral constraint approach posits that once individuals perceive environmental events cause uncomfortable feelings or interfering with goal attainment, people will attempt to restore their freedom by removing the obstacles (Nagar, 2006). Research using the behavioral constraint approach is largely based on Sommer's conceptualization of personal space and Brehm's theory of psychological reactance. Sommer (1969) described personal space as invisible boundaries surrounding the individual where intruders are not welcome. Territoriality is the action of occupying
space and maintaining the social order of individuals using the space to avoid personal

According to Brehm (1966), people adopt measures to attain their freedom because maintaining the freedom of choice is an important motivating factor. He stated, “given that a person has a set of free behaviors, she will experience reactance whenever any of those behaviors is eliminated or threatened with elimination” (p.380). Brehm (1966) also emphasized that the way in which a person responds to reactance depends on both justification and legitimacy. In other words, reactions to constraints depend on the level of control given to people at a given time and place.

In informal learning spaces, students are less bound by restrictions. However, given that any buildings on campus have their own managements and administrators, it is necessary to understand how administrative factors influence the behavior of students, thus affecting their decision to select places to study outside the classroom.

1.3.1.3. Environmental stress perspective

In this approach, environmental factors might become stressors and affect human behavior, function, and emotion. Lazarus & Cohen (1977) identified three aspects of environmental stress as 1) the effects of stress are the greatest importance to satisfaction and morale; 2) stress emotions strongly influence every aspect of adaptive functioning including, but not limiting to, problem solving, social competence, and somatic health/illness; and 3) environment can caused stress emotions such as anxiety, fear, guilt, anger, sadness-depression, and jealousy.

Evans & Stecker (2004) pointed out exposure to uncontrollable environmental
stimuli produces deficits in task performance linked to learned helplessness. Both acute and chronic exposure to noise, crowding, traffic congestion, and pollution is capable of causing learned helplessness in adults and children. Additionally, pre-exposure to brief, acute, and uncontrollable environmental stressors lead to difficulties in learning a new task and depression.

In learning environment research, the stress approach on person-environment fit is commonly used to evaluate the learning environment (Fraser & Fisher, 1983b; Porter & Umbach, 2006) and to explain student achievements (Awoniyi, Griego, & Morgan, 2002; Fraser & Fisher, 1983a). There are two competing versions of person-environment fit on stress; one focuses on the fit between environmental supplies and individual values while the other stresses the fit between environmental demands and individual abilities (Edwards, 1996). Under supply and value approach, stress is the possible result of a less than optimal match between individual needs and learning environment (Ahrentzen, Jue, Skorpanich, & Evans, 1982). Students may become stressed when the socio-physical environment does not match their expectation or desired amount of satisfaction. Under environmental demands and individual abilities approach, stress is the result of students’ inability to cope with environmental demands such as distractions, class interruption, and noise levels (Conners, 1983). In both approaches, optimal performance can only be achieved and stress avoided when environmental factors are compatible with individual abilities.

As much as there needs to be a fit between students and the learning environment for optimal performance, it may be a good idea to understand Net Gen college students’ choice of informal learning space within the person-environment fit framework. In light
of the Net Gen’s flexibility to choose informal learning spaces, they may favor places that
best fit their learning styles. Additionally, it is known that person-environment fit can
improve with individuals' attempts to adapt or rearrange the space (French et al., 1974).
Because of this, when investigating the choices of informal learning spaces, attention on
how individuals manage to improve the fit between themselves and the informal learning
spaces may be necessary.

1.3.1.4. Ecological perspective

Based on Lewin (1951)'s field theory and Barker (1968)'s ecological psychology, an
ecological perspective for school environment was developed (Barker & Gump, 1964;
that happen outside a person, also known as the outside context (Barker, 1968).

An ecological perspective to understand school environment considers that the
student, the school, and the community are parts of a complex, interdependent systems
(Barker & Gump, 1964). In other words, the whole school is involved in the educational
process, not just the teachers and the students (Barker & Gump, 1964).

Gump (1980) believed that schools comprise of clusters of settings. He indicated
that there are three basic aspects of settings: milieu, human components, and action
structures or programs. Physical milieu are inanimate factors of the school such as the
building, furniture, seating arrangements etc. Human components can consist of human
per unit (e.g. crowding, density, etc.), the mix of human components (e.g. races, minority
groups, etc.). Programs are action structures govern the schools (e.g. curriculum,
regulation, the management of space etc.). He emphasized that and that the nature of
events occurring in each setting depends on individual settings on the teachers' selection, creation, and management of environmental units. In other words, behaviors of students in schools are influenced not only by the physical environment factors, the human components, but also the way the schools are programmed, structured, managed, the way the society functions, and various outside factors that neither teachers, students, and administrators could solely decide.

For this reason, when researching college students' choice of informal learning spaces in higher education, it is critical to outreach beyond the thoughts of individual students and include the context that comprises higher education. It is also necessary to include the information from instructors, administrators, designers, campus facility planners, other people involved in universities, the learning paradigms, learning practices, and even popular social trends etc. in order to understand the programs or action structures that govern the behaviors of students in informal campus spaces.

1.3.2. The evolution of learning spaces in higher education

Educational buildings are constructed to serve certain educational paradigms. For most of the history of education, the educational system has focused on the instructors. Until recently, the student-centered learning paradigm begins to change the ways learning and teaching are conducted, thus, affecting the design and construction of educational buildings.

Throughout the history, there have been various changes in the design and functions of higher educational facilities. The first American colleges (Havard, Dartmouth, and Yale) were built around the 17th century, resembling the design of the
University of Oxford and Cambridge in England (Turner, 1984). However, American colleges were designed to have extroverted layouts, in which buildings shared open grass, rather than the enclosed courtyard style of their counterparts in England (Turner, 1984). U.S. President Thomas Jefferson who was involved in the construction of the University of Virginia in later years, called the architectural style of American colleges the academical village, where a shared focal point, the lawn, was included to promote interaction and shared knowledge among students and instructors (Leonard, 1998).

There have been many changes in the architecture of higher education campuses in America after the construction of the first higher education campuses. The Gothic collegiate era in the 19th century gave many American colleges a touch of beauty, institutionalism and prestige (Coulson, Roberts, & Taylor, 2010; Thelin, 2003), whereas, the utilitarian era left behind many ugly buildings that were constructed quickly to accommodate the sudden influx of students after World War II (Turner, 1984). Today, the modern campuses are designed with flexibility and collaboration in mind (Oblinger, 2006).

However, it is hard to find a campus that is totally designed in one style. Constructions of certain styles were usually done for several buildings or a collection of buildings on campus over a long period of time, making many American campuses a mixture of old and new buildings that were optimally designed for certain ways of learning - the old traditional lecture learning style or the modern collaborative learning styles. Changes on campus buildings continue as campus facilities all over America have struggled to find ways to maintain old buildings while facilitating the needs of students and the modern ways of learning with technologies.
The perception of learning spaces in higher education has also evolved throughout the years. In the past, researchers tended to differentiate classroom facilities and school facilities when discussing environmental factors (Gifford, 1987; Higgins, Hall, Wall, Woolner, & McCaughey, 2005; Schneider, 2002; Weinstein, 1979). For example, Weinstein (1979) reviewed contemporary studies about environmental variables of classrooms and reported that seating position, classroom design, furniture arrangement, density and crowding, privacy, noise, and windows had significant impacts on performances in the classroom context. Schneider (2002) reviewed more recent studies to find out that spatial configurations, noise, heat, cold, light, and air quality of school facilities affected students' and teachers' ability to perform. Higgins et al. (2005) differentiated between the physical environment of the school and that of the classrooms. The authors reported that for the school's built environment, important factors were temperature/air quality, noise, light, color, and other school building features; for classroom environment, important environmental factors were furniture and equipment, arrangement and layout, display and storage, and ICT (information and communications technologies) system.

Recently, the public image of higher education filled with lectures and dictations has gradually changed into collaborative learning activities inside and outside academic classrooms (Long & Ehrmann, 2005). As the result, the terms “learning space” are adopted by contemporary researchers when discussing the impacts of environmental variables on learning (Painter et al., 2013). Campus facilities are classified into two types of learning spaces: formal learning space and informal learning space (Painter et al., 2013).
On higher education campuses, interest in informal learning spaces has risen (Alexander, 2004; Price et al., 2003). Specifically, there is a decline of labs, a rise of multi-configurable classes or smart classrooms, a growing interest in mobile chairs, desks and displays, an increase in blended or hybrid learning, and a rising interest in new learning spaces such as information commons, learning corridors, gathering places, and etcetera. (Alexander, 2004). Many universities have experimented with new learning spaces, including, but not limited to cafeteria, information commons, collaboration areas inside and outside the libraries, living-learning spaces, and corridor niches (Oblinger, 2006). Radcliffe et al. (2008) described the characteristics of informal learning spaces as below:

“Many informal learning spaces appear similar to the common or ‘home’ rooms in university colleges. They have comfortable seating, smaller tables, limited basic kitchen amenities and a relaxed, unstructured atmosphere. It is in these informal learning spaces that students choose to gather and work collaboratively. Students identify these spaces as their own and use them for learning and recreational activities.” (p.8).

Three types of informal learning spaces were identified by Painter et al. (2013) in a review about informal learning spaces in higher education: (1) library informal learning spaces (computer banks, alcoves, lobbies, and unassigned spaces), (2) gathering spaces (student unions, student centers, and outdoor spaces), and (3) corridor spaces (transitional areas, alcoves along walls, unused lobby areas, courtyards and plazas). For informal learning spaces within libraries, preferred environmental factors are flexibility, comfort, technology, staff support and resources (Foster & Gibbons, 2007).
Students used social places for focused collaboration (planned group work), intermittent exchange (individual study with occasional interaction), serendipitous encounter (accidental meeting or consultation with peers), and ambient sociality (being present in the studying community but remain solitude) (Crook & Mitchell, 2012). Painter et al. (2013) pointed out that students use corridor spaces briefly or for longer periods during the time between classes and while waiting to meet with a faculty member. Painter et al. (2013) also insisted that in the design of corridor spaces, it is critical to provide the appropriate space available at the appropriate time as it can encourage students to work on their assignments without having to go across campus for more appropriate study areas.

In a tutorial, MacPhee (2009) provided useful suggestions on the design of informal learning space with technologies. The tutorial appealed for the transformation of campus transitional space with electronic displays, seating, tables, power outlets, and public Internet access terminals. It also advocated for more shading in outdoor areas to allow longer learning time, more collaborative spaces with refreshment supplies, and more multi-purposeful spaces.

1.3.3. The impacts of physical environmental factors on learning

In the relationship between learners and the learning environment, the environment is perceived through the learners’ perspective (Lewin, 1951). Researches have pointed out various environmental factors that affect learning performance. Below is the literature review on the impacts of setting, noise, light and color, crowding, privacy, space (personal space, crowding, territoriality, privacy), and environmental competences.
upon learning performances.

1.3.3.1. Setting

The setting of an educational institution (e.g., school size, overall design, condition, and other school features) could impact students' behaviors (Gifford, 1987; Higgins et al., 2005). Particularly, a smaller school size generated better participation, better engagement in learning activities, and higher satisfaction among both teachers and students (Gifford, 1987). Pathways and positive outdoor spaces were also found to correlate with student achievement (Tanner, 2000). Newer buildings of better quality with better aesthetics improved student behaviors and teaching behaviors (Schneider, 2002).

Informal settings can also influence learning and working behaviors (Forlano, 2008; Schmidt, Ouyang, & Zhu, 2012; Thompson & Arsel, 2004). Going to Starbucks, for example, was considered a symbolic value for the culture of the local community (Schmidt et al., 2012; Thompson & Arsel, 2004). The choice of workplace was also found to relate to the settings of the coffee shops (Forlano, 2009). Specifically, Forlano (2009) noticed that a designer tended to use a busy and popular coffee shop for brainstorming activities, and a quiet and unpopular coffee shop for finalizing the design. This suggests that informal learning spaces could have different attractions for students based on their particular tasks or types of study.

1.3.3.2. Noise

The literature on noise is rather controversial. While some research found that noise deteriorated learner performance and harmed feeling, others indicated that some types of noise could be beneficial. In a review of the literature about the impacts of noise
on learning, Szalma & Hancock (2011) revealed mixed findings. Noise was found to increase mental workload, distract attention, and increase worries. However, noise was also found to increase levels of alertness and attentional selectivity, thus, improving performance (Szalma & Hancock, 2011).

Continuous noise or background noise is a concern in informal learning spaces (Jamieson, 2009). Low frequency noise was found to interfere with performance of meticulous task (such as proof-reading) and increase annoyance compared to flat frequency noise (Waye, Bengtsson, Kjellberg, & Benton, 2001). However, background noise and music (vocal or non-vocal) had no impact on working memory capacity (Alpert & Ly, 2012).

However, researchers have noticed that students, the Net Gen in particular, seem to enjoy noise (Advokat, Lane, & Luo, 2011; Bennett, 2007; Head & Eisenberg, 2011). Bennett (2007) reported that college students wanted study environments that were free of distractions, but with some level of noise and activity. Specifically, 52% of participating students preferred quiet and calm, but not silence and solitude, while 15% of them enjoyed some noise and distraction. Many students were found listening to music while reviewing a chapter in a textbook (Head & Eisenberg, 2011). The students also reasoned that ear plugs and music are helpful to block distraction from the environment (Advokat et al. 2011). This shows that noise distractions from the informal learning spaces may play a role in Net Gen college students' preference for informal learning spaces.
1.3.3.3. Light and color

Light and color has been well-mentioned in the research on learning environment, however, the association between light, color and learning, performance and wellness are not very strong (Gifford, 1987; Tofle et al., 2004). Recent studies have reported mixed findings on the impacts of lighting. For instance, Haijing and Gang (2011) reported that under the high and medium color temperature of fluorescent lighting (6500 K vs 4000 K), participants learned more efficiently (i.e. had a low error rate of visual work, high proofreading speed, and high mental work ability) while under the fluorescent lighting of medium color temperature, learning became more relaxing. This suggests that different lighting may be good for different types of learning activities. Additionally, day lighting or electric lighting did not affect task performance, however, it affected the mood of occupants (Boyce, Hunter, & Howlett, 2003). Daylight was more desirable as it produced better moods (Boyce et al., 2003). This suggests that lighting; especially daylight may be a factor that affects the students' choice of informal learning spaces.

1.3.3.4. Space

Popular concepts within the literature about spatial aspects of the physical environment may include crowding, personal space, territoriality, and privacy (Gifford, 1987). Below is a review of the literature concerning these spatial factors.

1.3.3.4.1. Crowding

Density is the ratio of users to area (Gifford, 1987). Crowding, on the other hand, is the perceived spatial restriction caused by density (Stokols, 1972). In general, high density affects the physical movement of activities in the classroom, however, crowding
affects performance depending on individuals and contexts (Gifford, 1987). Weldon, Winer, Loewy, & Elkin (1981) conducted three experiments on the effects of crowding on classroom learnings. The result showed that: 1) Perceptions of crowding differed by vocational perspectives; 2) The relationship between crowding motivation and achievement was a curved line or moderate level of crowding was more beneficial to learning; and 3) A moderate level of density was more beneficial than low or high levels of density. Thus, the perception of crowding and density may influence student’s preferences for informal learning spaces.

A recent study found that the impacts of crowding on performance were dependent on the nature of tasks: severe crowding affected only reading achievement, but not math achievement (McMullen & Rouse, 2012). Crowding was also found to affect moods as customers in a restaurant were reported to be more positive when seating was less dense (Yildirim & Akalin-Baskaya, 2007). Given that crowding is related to task performance (McMullen & Rouse, 2012) and mood (Yildirim & Akalin-Baskaya, 2007), it may have an impact on students’ choices of informal learning spaces.

1.3.3.4.2. Personal space

The perception of crowding is closely related to the perception of personal space, or invisible boundaries surrounding the individual where intruders are not welcome (Sommer, 1969). Personal space is portable, defensive, culturally-based, situational-based, and sometimes difficult to identify (Sommer, 1969). An early study found that male students enjoyed greater seating distance than female students (22 vs. 13 inches) and that students preferred semicircle and U shape seating (Heston & Garner, 1972).
However, recent studies have accounted for the roles of information technologies in the life of participants, and revealed that perception of personal space has changed (Lamberg & Muratori, 2012; Sommer, 2002).

For instance, Sommer (2002) noted in his informal invasions at public locations that sitting close to people who were talking on the phone made them more uncomfortable, shortened their conversations, and hastened their departures. Lamberg and Muratori (2012) also examined the use of phones in public spaces. They found that the use of cellphones among pedestrians increased cognitive distraction, reduced situational awareness, and increase unsafe behaviors (Lamberg & Muratori, 2012). The use of other forms of technology in public spaces and their impacts was also explored. Positive emotional states induced by music (from headphones or loudspeakers) were found to reduce the representation of personal space, or allow people to come closer to each other (Tajadura-Jiménez, Pantelidou, Rebacz, Västfjäll, & Tsakiris, 2011).

The findings suggest that when interacting with technological devices, individual's perception of space and accuracy of activities are much different from when there are no technological devices. Thus, when exploring students' choices of informal learning spaces, attention to the ways technologies affect their perception of personal space is needed.

1.3.3.4.3. Territoriality

Territoriality concerns the action of occupying space and maintaining the social order of individuals using the space (Sommer, 1969). Altman (1970) suggested that human territoriality includes perceptions, use and defense of places, people, and objects,
ideas through verbal self-makers and environmental prop behaviors. A recent study about territoriality in collaborative workspace reported the size and shape of personal territories were influenced by various factors including number of collaborators, seating arrangements, size of the table, task activities, and visible barriers (Scott, Carpendale, & Inkpen, 2004).

Studies about territoriality in coffee shops have gained more attention as more people use the “third place” to do work related activities (Forlano, 2008). Griffiths and Gilly (2012) discovered that in order to maintain undistracted privacy, customers in a coffee shop engaged in territorial behaviors by purchasing or using an item with the café logo, decreasing turnover, and discouraging other customers. Another study reported that seeing many customers rejecting the opportunity to share tables in the coffee shop affected other customers' emotion and perception of fairness (Wu, Mattila, & Han, 2014). As users of coffee shops expressed unique way of perceiving territoriality, it may be possible that students who enjoy studying in informal learning spaces have unique perception about territoriality and this may affect their choices of informal learning spaces.

1.3.3.4.4. Privacy

If territoriality is a person's reaction to prevent intruders into personal space, privacy is one's decision on when, how, and to what extent to release personal information to others (Westin, 1967). Four states of privacy, representing the mechanisms in which one employs to create privacy, were identified by Westin (1967): 1) solitude (freedom from observation of others), 2) intimacy (seclusion so that group members
achieve a close relationship), 3) anonymity (freedom from identification in public places and for public acts), and 4) reserve (desire to limit disclosures to others). Altman (1975), another influential researcher on the topic of privacy, suggested that privacy is a social process that involves interaction between people, physical environments, and cultural context.

In the age of technology, privacy seems to be perceived differently. Social networking sites such as MySpace or Facebook leave users with an elusive privacy (e.g. teenagers assumed that online posts were private as long as they were not readable by their parents) (Barnes, 2006). The careless habit of privacy in the digital age seems to be carried over to the real world as more incidences of people conducted intimate acts in public places were reported (Zhao, 2006). An observation conducted by Christie (2009) on behaviors in a bookstore cafe revealed five distinct findings about privacy and territoriality in the digital age:

1. People worked independently, quietly, and spread out their belongings as a way to claim territory.
2. People created their own space with technological devices (no removal of headphones while communicating).
3. People had no problem taking up public space for personal activities.
4. People behaved the same in private space as in public space.
5. It was socially acceptable to routinely use public space for personal activities (read, nap, spend time, and use the restrooms without buying a single item in the bookstore cafe). This can be generalized to students using informal learning spaces on campus in that they may take a ‘public space’ and turn it into a private
space for study.

As privacy seemed to be perceived differently under the influence of technologies, it may be a good idea to investigate the perception of privacy held by current college students. Their new perceptions of privacy could affect their choices of informal learning spaces.

1.3.3.4.5. Environmental competence

Environmental competence is defined by Steele (1980) as “people's ability to deal with their immediate surroundings in an effective and stimulating manner (p.225)”. Steele suggested that environmental competence varies depending on (1) personal style, attitudes, and awareness; (2) knowledge; and (3) practical skills. Considering that an individual's ability to deal with the physical environment varies, their choices of informal learning spaces may vary as well depending on their own abilities to deal with the surroundings.

Environmental competence plays an important role in adjusting the person factor in the model of person-environment fit - a model that describes the compatibility between individual and the surrounding environment. Environmental competence is expressed through coping with environmental stress, which requires effort to improve the person-environment fit by adjusting the person (i.e., adaptation) or the environment (i.e., rearrange the space) (French, Rodgers, & Cobb, 1974). Another study revealed that in order to reduce stress caused by environmental factors, intervention treatments should satisfy both demands-abilities fit and needs-supplies fit, and should be customized to accommodate the needs and abilities of individuals and to resolve misfitting issues.
There has not been a study that discussed the environmental competence of Net Gen students. Prior research has shown that the Net Gen prefers to study in informal spaces (Alexander, 2004; Tapscott, 2008). However, whether they are able to handle the environmental stress in informal learning spaces in an effective and stimulating manner is still questionable. Consequently, research is needed to understand the Net Gen's environmental competence and how their perception of environmental competence affect their choices of informal learning spaces.

Chapter conclusion

Students are increasingly enabled by technology to pick and choose their learning environment. They are increasingly drawn to places where they feel comfortable, sociable and where they have the opportunity to collaborate. However, the research on why they select an informal space for learning is scant. Additionally, there is currently a gap in the literature with regard to the way students, especially Net Gen college students, interact with the physical environment of informal learning spaces. For these reasons, a study about students' choice of informal learning spaces is needed.

Chapter summary

This literature review presents the main theories and concepts about Net Gen college students, current learning environment, and the relationship between students and the physical learning environments. Through the review of research, any gaps in the scholarship with regard to the informal learning space issues were identified. The literature review shows that current college students are unique in their ways of learning
and processing information. The current learning environment also supports various active, collaborative, social, and informal learning activities. There are various environmental factors involving in the interaction between students and the learning environment. Because formal learning accounts for most part of the history of education, there are plenty of research on classroom spaces but few on informal learning spaces. For this reason, more research on informal learning space is needed.
Chapter introduction

In order to find out how students choose informal learning spaces, this study employed a qualitative approach, specifically grounded theory. Below, I present the methods of research that were employed in this study, showing the process in which the study was formed, from the research question, the research design, to the ways in which data were collected and analyzed.

2.1. Research question

There is not much information available about the ways Net Gen college students interact with the physical environment of informal learning spaces. Given that Net Gen college students are so influenced by information technology, they develop unique behavioral norms and unique learning styles (Prensky & Berry, 2001; Tapscott, 2008), and given that these students are increasingly interested in studying at informal learning spaces (Alexander, 2004; Price et al., 2003), I formed the research question of my study:

“How do today's college students choose informal learning spaces on higher education campuses?”

Students tend to perform better when they are in a physical environment that fits their preferences (Fraser & Fisher, 1983b; Fraser & Treasure, 1986). However, in formal
learning, students cannot choose learning locations. Often, they are required to go to
certain classrooms assigned to their instructors by their academic departments. When it
comes to self-directed learning beyond the class hours, students have the flexibility to
choose their own informal learning locations that fit them the most.

There have been studies addressing environmental preferences of informal
learning spaces described in Painter et al. (2013), however, there has not been a study to
investigate the environmental preferences of current college students from the decision-
making perspective. When making decisions, one has to evaluate and weigh all relevant
factors. A study of the relationship between students and the learning environment
through the lens of place choice may provide new understanding of how college students
think about and respond to physical environmental factors. The current study sought to
accomplish that.

2.2. The form of the study

In the search for an appropriate method to investigate the relationship between
students and informal learning spaces, a quantitative survey was incapable of revealing
the deeper nuances of the relationship. The method selected for this study needed to
reflect the contexts of interactions and uncover all possible reasons that students used to
select informal learning spaces. For this reason, I employed a qualitative approach to
uncover details of the relationship between students and informal learning spaces,
especially the ways students interact with the physical environment of informal learning
spaces.

Given the nature of the subject, which involved the interpretation of students'
perceptions about informal learning spaces and their interactions with these informal learning environments, I chose symbolic interactionism to be the philosophical stance underlying the method of this study. Symbolic interactionism holds three assumptions: 1) people act towards things depending on the meaning they assign to them; 2) these meanings arise from social interactions, and 3) these meanings are interpreted through an individual's perspective (Blumer, 1986; Crotty, 1998). By using symbolic interactionism in this study, I made the assumptions that 1) individuals gave meanings to informal learning spaces, 2) individuals made their choices based on such meanings; and 3) these meanings were influenced by individuals' perspectives.

I chose grounded theory to be the method of data analysis. Grounded theory is regarded as a scientific method concerning the generation, elaboration, and validation of social sciences (Glaser & Strauss, 2009). Because, its goal is to generate theories to understand phenomena, grounded theory is powerful in uncovering relevant conditions, determining the responses to these conditions, and the consequences of actions (Corbin & Strauss, 1990). A good grounded theory is not only inductively derived from the data but is also subjected to theoretical elaboration, and is judged for adequacy (Haig, 1995). With grounded theory as the method of data analysis, I expected to derive from my findings useful explanations for students' choices of informal learning spaces.

I particularly employed grounded theory from case studies, also known as “a research strategy that involves using one or more cases to create theoretical constructs, propositions, and/or a mid-range theory from case-based, empirical evidences” (Eisenhardt, 1989, p.25). Because there were various informal learning spaces on a single higher education campus, each with its own unique environmental features and
architectural designs, the understanding of how students choose informal learning spaces might not be completed without the investigation of more than one informal learning space. Additionally, case studies often involve in-depth data collection, with which grounded theory could rely on to generate the relationships that govern a theory (Creswell, 2012). The intensive descriptions of each informal learning space together with the themes and relationships identified by grounded theory provided a more salient picture of informal learning spaces, thus, making the constructed theory about students' choices of informal learning spaces more reliable.

To collect data, I relied on micro-ethnographic practice. Micro-ethnographic research projects have the same characteristics of long-term ethnographic practice (e.g., field research, participant observation, interviews) but focus on a site for a short period of time (Powell, 2010). With micro-ethnographic practice, I aimed at finding out as much information about several informal learning sites as possible within a limited time frame. I also referred to auto-photography to guide and stimulate the discussions between the interviewer and interviewees (Curry, 1986) and to get an entry point to access interviewees’ viewpoints (Radley & Taylor, 2003).

2.3. Methods of data collection and data analysis

Throughout the process of collecting data for this study, I tried to keep a dialogue between myself and the data by going back and forth between the old and new data to gain insights, avoid misinterpretation, and foster deep understanding of the phenomenon under investigation. The data were analyzed as they were collected (Charmaz, 2006). In other words, data collection and data analysis were conducted simultaneously, so that old
data could guide new data collection and new data confirm what were reported in the old data. This process was a part of a comparative analysis procedure which helped improve the accuracy of the arising themes and relationships between them (Glaser & Strauss, 2009).

2.3.1. Data collection process

2.3.1.1. Site selection

Eisenhardt (1989) stated that for theoretical sampling, researchers should purposefully select diverse organizations from the selected population. Using similar strategies, I selected one state-owned university in the Midwest of America and determined to investigate various informal learning spaces on this campus. Because informal learning spaces could be built within different types of buildings: academic buildings, residential buildings, student-service buildings, administrative buildings and many others, I decided to look for variations of informal learning spaces within types of buildings. I also narrowed the scope of the study into indoor informal learning spaces, which excluded outdoor spaces on campus that students may use for informal learning purposes.

I used snowball sampling to make use of insiders' help in locating people and places for the study. Snowball sampling is a non-purposive sampling technique in which participants are selected at the convenience of the researcher (Biernacki & Waldorf, 1981). Using snowball-sampling technique for site selection, I made use of participants' recommendations of informal learning spaces on the selected campus.

Before collecting data for this dissertation, I conducted a pilot study to test the
viability of this research. I selected one student commons and began daily observations. I also conducted interviews with several students who were studying there. During the interviews, the students recommended several informal learning spaces on campus where they usually spent their time. Using this information, I formed a list of 21 popular informal learning spaces on the selected campus. I recognized that these informal learning spaces could exist within student centers, residence halls, libraries, and academic halls. With a list of informal learning spaces that the students provided me, I contacted a campus facility planner to identify informal learning spaces that were part of their consideration. In an email, the campus facility planner provided me with a list of 8 informal learning spaces that the university recently renovated. Matching the campus facility planner's list of informal learning spaces and the students' list of informal learning spaces, I created a list of buildings potential for further research.

To narrow the selection, within each type of buildings, I chose two representations; each of which has unique informal learning space that deserved further examination. Within student center building type, I chose one old student center and one new one; both had large student commons and various niches and nooks. Within residential hall building type, I select a recently renovated building complex that consisted of two buildings connecting to each other. Both buildings shared a waiting area, which was recommended to me by one designer as her successful design. Within library building type, I selected the main library and one departmental library out of the list. The two libraries were different in size as well as furniture. For academic halls, I acknowledged that there were old, renovated, and new halls, which were much different from in each other in terms of informal learning space availability. From the list of
buildings, I organized above, I selected two four academic halls; one without designated learning space, one with recently renovated study room, one with an informal learning lounge highly recommended by the campus facility planners, and one with various informal learning nooks highly recommended by the campus facility planners, instructors and students. All selected building were within 500 meter radius of each other, making it a tight learning community.

2.3.1.2. Site observation

Zeisel (1981) pointed out that observation is a useful method to understand how people use and interact with the physical environment. He noted, “Observing behavior means systematically watching people use their environment...What do they do? How do activities relate to one another spatially? And how do spatial relation affect participants? How a physical environment supports or interferers with behaviors taking place within it” (p.111).

To aid the observation, I used observation sheets, which contained the floor plan of the informal learning spaces, date and time of observation. I outlined the floor plan of each informal learning space with indications of furniture, power outlets, and windows. For large sites consisting of more than one informal learning spaces, multiple observation sheets were used at each visit.

During the observation, I marked the number of students in different areas, indicating their gender and their technological devices. However, I soon realized that my denotation of these specifications might not get exact numbers. In large informal learning
sites such as the student centers and the libraries, people continuously entered, left or moved around. For this reason, I decided to estimate the specifications by percentage instead of counting. For crowding, I estimated roughly an approximate percentage of students per seating availability. For technological devices, I estimated a percentage of laptop per participant. For headphone usage, I estimated a percentage of headphones per student. Many times, it became easier for me to estimate the number of empty seats, or the number of people without technological devices then I did a reversed math to find out the needed percentages.

Figure 1. An Example of Observation Notes
I measured the level of noise in each informal learning space with a smart phone application called Sound Meter. To measure the sound level, I stood in the middle of the informal learning space, turned on my application, and waited for one minute as the sound indicator slightly moved back and forth before selecting the number in between.

I employed semi-behavior mapping, a method to understand human behaviors in space based on maps, to guide my observation. On behavior map sheets or observation sheets, I noted students' behaviors, the noise levels, the unique environmental features, any events that occurred during the observation time, and other incidences. For example, in an observation of one area of a student commons (see figure 1), I indicated occupied seats with gender. Coupled with the floor plan and the noise level at different areas of the student commons, I was able to roughly relate environmental factors and crowding distributions. Information from multiple observations generated behavioral patterns at each informal learning space, with which I further confirmed through participant interviews. More behavior maps on other informal learning spaces could be found in the appendix 4.

I managed to stay at each informal learning space for at least an hour per visit. Depending on the size of the site, and the number of informal learning spaces within that site, it might take longer to go through all informal learning spaces in each site. The least time per visit was spent on academic halls because in these buildings there were only a few informal learning spaces. However, for large sites such as the libraries or the student centers, a visit might take up to three or four hours.

I also conducted the observations at different times of day. If one site was observed in the morning, the next observation session would be conducted in the
afternoon or at night. Each observation session was summarized by the end of the day to
guide the next observation and the interviews.

On average, each building was observed continuously for two weeks or more.
Observation continued until no new data could be found. The whole observation lasted
four months from January to April.

2.3.1.3. Participant selection

Participants were recruited from this study using a purposive sampling technique.
I determined that on campus, information provided by college students was the most
valuable in understanding their choices of informal learning spaces. For this reason, the
main source of information came from the interviews with student participants. I also
acknowledged that instructors, campus facility planners, campus designers, and building
administrators could provide additional useful information about places that students
preferred and the ways they used informal learning spaces. This was also a good way to
triangulate my own interpretation of how students use informal learning spaces with the
interpretations from instructors, campus facility planners, campus designers, and building
administrators.

Student participants were mostly identified at each informal learning space during
the observation. In order not to interfere with their work, I tried to approach the students
when they just arrived, were about to finish, or took a study break. For student
participants living in the residence halls, the residence hall's administrators introduced me
to them. The introduction helped me to gain trust among the students so that they could
share detailed information about their own living and studying spaces.
For instructor participants, I used a convenient sample. Specifically, I emailed professors in my circle whom I believed could provide interesting information about the way students use informal learning spaces. Four professors agreed to participate in the interview, and all of them were male. Three instructors were from School of Education, and the other from College of Agriculture. The gender and the specialties of the instructors were not an issue since the study focused on individual's knowledge about the students' usage of informal learning spaces on campus, which was not affected by the instructors' background.

For facility planners, designers, and administrators, I employed snowball sampling to take advantage of the information and people that they knew. I requested an interview with the campus facility planner who provided me with a list of informal learning spaces. This campus facility planner introduced me to another co-worker and helped introduce me to the designers of the student centers and the residence halls. The designers and the instructors, additionally, helped introduce me to the administrators. The administrators helped introduced me to some students.

The snowball sampling techniques I employed in this study proved to be helpful in data collection, especially for a grounded theory research when the depth of the data were more important than the breadth of the data. Through the introduction of participants, it was easier for me to mingle among the participants, gained their trust, obtained access to spaces and collect insiders' information. This really improved the accuracy of the data, and thus, enhanced the quality of the theory that was supposed to be created with the data.

To understand and keep track of the relationship between participants, I illustrate
the trail of snowball sampling in a figure. Figure 2 shows the relationship between the researcher and the participants in this study. The direction of the arrows indicate whether the destination persons were directly selected by the researcher or through introduction of third parties. Students were both directly selected by the researcher and introduced to the researcher through instructors and administrators. The research directly contacted facility planners, who introduced the researcher to designers, who connected the researcher with administrators. Administrators were also introduced to the researcher through instructors as well.

Figure 2. Participant Relationship Diagram

2.3.1.4. Interview

Semi-structured interviews were employed in this study so that participants could express their viewpoints in a more open manner than in structured interviews (Flick, 2014). Adopting Flick's (2014) semi-structured interview guidelines, I managed to avoid
imposing a viewpoint upon participants by asking non-directive and non-specific questions. Retrospective questions and comparative questions were frequently used (e.g. What was your experience the last time you visited this building?) (Flick, 2014). Additionally, comparative questions helped me to collect information about several informal learning spaces within a single interview. For example, I asked the students to compare the learning experience in two student centers or several informal learning spaces that they knew. In the appendices, I provided the protocols used to interview students, campus facility planners, designers, administrators, and instructors. These protocols were flexibly used; the questions could be extended or omitted depending on the situation.

Before the interview, each participant was given the IRB description of the project and a demography questionnaire. Participants were instructed to sign an agreement for interview then answer the demography questionnaire. The demography questionnaire identified each participant's age, gender, year in college, major, device ownership and favorite places to study outside the classrooms. The information was used to lead the interview.

I began the interview by asking the students their reasons for being at the current informal learning space, followed by questions regarding the learning activities that they were doing, their likes and dislikes about environmental factors in the learning space, their favorite learning space, their frequency of going there, their recommendations for campus facilities and so on.

To guide and stimulate the discussion of environmental factors at each informal learning space, I asked participants to take photos of the environmental factors that they
liked and disliked. In order to gain their trust, I gave them my smart phone with which they went around and took photos while I was sitting at their tables watching over their belongings. Participants then showed me the photos as they verbally described what objects or activities were in the photos and why they captured them.

I followed different protocols when interviewing campus facility planners, designers, administrators and instructors. For the campus facility planners, the designers, and the administrator, the interview questions focused on the design of informal learning spaces and how the design accommodated the needs of the students. For the instructors, the focus was on their opinions about the usage of informal learning spaces and the ways technology affected students' learning.

Interview length varied depending on participants with the shortest one lasted about five minutes and the longest one lasted about an hour. Depending on the situation, the interview could be conducted with one or more participants. When an interview had more than three participants, I called it focus group. For focus groups, I tried my best to encourage participants to equally share their viewpoints. In this study, focus group interviews only took place in the residence halls; interviews at other facilities were usually conducted with one or two students.

All interviews were recorded with an MP3 player, which was small enough not to distract the participants but good enough to record their voices clearly. Participants were informed of the fact that the interviews were being recorded. The recordings were later transcribed to create a pool of data for analysis.

Interviews were conducted before and after observation sessions. This made it easier to triangulate observation findings and interview findings as they were in the same
context. Observation notes usually helped guide the semi-structured interview questions the next day. Answers to the interview questions may suggest certain aspects of behaviors that should be attended in the next observations or the next interview.

2.3.2. Data analysis

2.3.2.1. Grounded theory as a method of data analysis

Eisenhardt (1989) said “overlapping data analysis with data collection not only gives the researcher a head start in analysis but, more importantly, allows researchers to take advantage of flexible data collection” (p.529). Following Eisenhardt's suggestion, data collection and data analysis in this study were conducted simultaneously.

A summary of daily observation and interviews were written by the end of each observation day. Rough thematic analysis was conducted based on each day summary to guide the next interviews and observations. This activity not only allowed me to keep track of the themes emerging from the data but also informed me of when data were about to be saturated. At approximately 20 hours of observation per facility and 42 student participants, I realized from my daily summaries that the themes arising from the data were saturated; I stopped the observations and the interviews and start transcribing them. Additional observations were conducted for several sites that deemed more information and clarification.

2.3.2.2. Coding

To aid coding interview transcriptions, observation notes and photographs, I used Text Analysis Markup System (TAMS), a software for qualitative research coding. This software allows users to highlight data chunks and group them into topics and sub-topics.
It also allows users to quickly pull out data chunks by themes. I found the software to be very helpful in keeping track between the raw data and the themes.

Step 1: open coding

I used TAMS for open coding; a coding process involves labeling and categorizing phenomena as indicated by the data (Pandit, 1996). The result of open coding was a list of categories or themes representing issues being discussed. To help open coding, I referred to foreshadowed research questions to help the coding process (Coffey & Atkinson, 1996).

Figure 3. An Example of Open Coding in TAMS

Figure 3 presents an example of open coding using an interview transcript. Using TAMS, I created codes, which presented the themes arising from the data. These codes were applied to the interview transcript on the left. An additional example of open coding can be found in appendix 5.

Figure 4 presents how raw data could be retrieved from a code. A list of 13 pieces
of raw data that are attached to the code “logical space” in TAMS; some are nested within other codes such as “study hallway” or “quiet” or “library stigma”. By frequently check the correspondence between the raw data and the codes (the themes), I was able to assure that the names of each theme reflected its content.

Figure 4. An Example of the Linkage between Raw Data and the Codes in TAMS

<table>
<thead>
<tr>
<th>#</th>
<th>code</th>
<th>data</th>
<th>comment</th>
<th>coder</th>
<th>doc</th>
<th>begin_loc</th>
<th>end_loc</th>
<th>bare_loc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>3-18-2014-</td>
<td>1430</td>
<td>1714</td>
<td>1337</td>
</tr>
<tr>
<td>2</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>3-19-2014-</td>
<td>2031</td>
<td>2156</td>
<td>1909</td>
</tr>
<tr>
<td>3</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>3-19-2014-</td>
<td>2211</td>
<td>2341</td>
<td>2066</td>
</tr>
<tr>
<td>4</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>3-19-2014-</td>
<td>1143</td>
<td>1448</td>
<td>1020</td>
</tr>
<tr>
<td>5</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>780</td>
<td>886</td>
<td>780</td>
</tr>
<tr>
<td>6</td>
<td>logicalspace</td>
<td>library stigma</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>1164</td>
<td>1470</td>
<td>1095</td>
</tr>
<tr>
<td>7</td>
<td>logicalspace</td>
<td>(study hallway)</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>4337</td>
<td>4477</td>
<td>4079</td>
</tr>
<tr>
<td>8</td>
<td>logicalspace</td>
<td>frequency]...</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>1212</td>
<td>1519</td>
<td>1079</td>
</tr>
<tr>
<td>9</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>1535</td>
<td>1577</td>
<td>1381</td>
</tr>
<tr>
<td>10</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>4-8-2014-5</td>
<td>7152</td>
<td>7469</td>
<td>6627</td>
</tr>
<tr>
<td>11</td>
<td>logicalspace</td>
<td>(quiet)logicalspace</td>
<td>(quiet)logicalspace usually go</td>
<td></td>
<td>4-10-2014-</td>
<td>818</td>
<td>924</td>
<td>780</td>
</tr>
<tr>
<td>12</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>4-10-2014-</td>
<td>1198</td>
<td>1503</td>
<td>1094</td>
</tr>
<tr>
<td>13</td>
<td>logicalspace</td>
<td>logicalspace...</td>
<td></td>
<td></td>
<td>4-10-2014-</td>
<td>1583</td>
<td>1049</td>
<td>1450</td>
</tr>
</tbody>
</table>

A list of all open codes retrieved from this study could be found in appendix 6.

Step 2: axial coding

Next, I conducted axial coding method or recognizing categories and determining the connections between them (Corbin & Strauss, 1990; Kendall, 1999). I manually did the coding. First, I printed all the themes or codes generated in TAMS on note cards then I lay them out on a large table. Each note card contain one open coding theme. Using Lewin (1951)'s formulation B = f(P,E), I identified two major categories known as Person and Environment and began to locate the open coding themes accordingly. Once the open
coding themes had been separated into Person factor and Environmental factor, I began to classify open coding themes within each categories.

At this stage, I used environmental categories in the literature review to guide further classification. I managed to group open coding themes under environmental categories identified in the literature such as setting, noise, light and color, crowding, privacy, personal space, and territoriality. For groups of open codings that did not belong to any of the environmental categories above, I gave them names. These were called emerging categories from the data. The emerging categories included distance, management, action, like, refreshment, and furniture. For open coding themes under person categories, I managed to grouped and labeled them into learning style, task, technology.

Figure 5. Step 1 in Axial Coding: Organizing and Creating Categories

![Step 1 in Axial Coding: Organizing and Creating Categories](image)
Figure 5 shows the way I manually classified axial coding. On two pieces of large paper, I drew two main categories named person and environment. On smaller rectangular pieces of paper, I wrote categories suggested by the environment behavior literature. For themes that did not belong to any of the given categories, I created small round pieces of papers to label the new categories that representing the topic shared among the selected themes. I continued to shuffle the open coding cards around until I found that no more new category should be created to organize the open coding cards.

To further distill the categories, I drew multiple diagrams to illustrate the relationship. I was between two minds whether to place learning task under person factor or making a third major category named learning task besides the two categories person and environment. Finally, I decided that it was better to maintain the core diagram which contained two major categories person and environment. I reorganized the person categories into two sub-categories named the nature of the learning task and needs. I found that needs was a more generous category name that could encompass student learning style, their habits, and their desire to be the ideal person.

To determine the relationship between axial categories, I followed the guidance of axial coding by Kendall (1999). Specifically, I reorganized axial codes into conditions, phenomena, context, intervening conditions, actions/strategies, and consequences. For example, in figure 6, I dissected the relationship between different conditions of noise, the impacts they had on students, the location that they usually occurred, and the action that students might take to improve their experience. Too loud or too quiet noise lead to the result of unable to focus. Buzzing noise helped students to have good mood to study.
And places that were not noisy or quiet were found to help focusing the most.

To keep track between the raw data and the distilled categories, I regularly cross-checked the formed categories with the raw data through TAMS. This enabled me to make sure that the formed themes were grounded in the data or to secure the connection between raw data and formed themes.

A list of all axial codes in this study could be found in appendix 7.

Figure 6. Step 2 in Axial Coding: Finding Relationships

2.3.2.2. Theory generalization

The results of axial coding were elements of theory: conceptual categories, their properties and the hypothesis, or the relations among categories (Glaser & Strauss, 2009). During the process of generalizing theory, comparative analysis was used to make sure that the evidences were accurate, the facts had generality, the concepts were specific, and the hypotheses were verified with facts from the data (Glaser & Strauss, 2009). To make
it easier to link categories from axial coding, I created a table to organize the categories, their properties and relevant hypotheses (see figure 7). These categories were further synthesized and validated with new data until no new information could be found.

In the next step, I compared the emerging concepts, theories, or hypotheses with the existing literature (Eisenhardt, 1989) to create a theory to explain the choices of informal learning spaces. Using Lewin's (1951) formulation $B = f(P,E)$ as the base for the construction of my new theory, I regrouped the axial categories under two main categories “person factors” and “environmental factors” and indicated the ways the two factors interacted with each other. I carefully examined the model with the raw data to make sure that relevant information was presented in the model and that the model closely reflected the data.

Table 1

Categories and their relationships

<table>
<thead>
<tr>
<th>Category</th>
<th>Properties of Category</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of learning task</td>
<td>The amount of cognition/attention required to perform a learning task</td>
<td>- For low attention tasks (design, doing homework, doing practice), students would select an environment with a medium level of distractions (buzzing noise, moderately crowded)</td>
</tr>
</tbody>
</table>

61
students would select environment with few distractions (low noise, not crowded)
- During in-between class time, students do not care much about the impacts of environmental factors

<table>
<thead>
<tr>
<th>Needs</th>
<th>The needs to balance social life and academic life of college student</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- To balance social life and academic life, students tend to choose places that give them both chances to interact with peers and to be alone and focus on their learning task</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>The overall design of the informal space</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- For low attention tasks, students prefer social-oriented setting</td>
</tr>
<tr>
<td></td>
<td>- For high attention tasks, students prefer private-oriented setting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Noise</th>
<th>The amount of noise in an informal space</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- For low attention tasks, student prefer medium level of noise</td>
</tr>
<tr>
<td></td>
<td>- For high attention tasks, student prefer quiet places</td>
</tr>
<tr>
<td>Light and color</td>
<td>The amount of sunlight and color in informal space</td>
</tr>
<tr>
<td>Crowding</td>
<td>The perceived spatial discomfort caused by density</td>
</tr>
<tr>
<td>Privacy</td>
<td>One's self decision on when, how, and to what extent information about them should be released to others</td>
</tr>
<tr>
<td>Furniture</td>
<td>Furniture that students prefer or recommend for different task</td>
</tr>
<tr>
<td>Amenities</td>
<td>Other features that attracted students</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Location</td>
<td>The distance between the current position of the students and the destination that they want to travel to</td>
</tr>
<tr>
<td></td>
<td>- To attract students, the learning space need to be visible so that the students recognize them and use them</td>
</tr>
<tr>
<td>Management</td>
<td>The roles of building rules upon student usage</td>
</tr>
<tr>
<td></td>
<td>- The more the informal learning spaces are funded by student budgets, the more that they feel they are in control of the learning spaces, and the more they modify the spaces to fit their learning experience</td>
</tr>
</tbody>
</table>
2.4. Other methodological considerations

One of the concern of qualitative research is validity or trustworthiness of data collection and data analysis. Because data for this study were collected using snowball-sampling, a method that depends greatly on the researcher's encounters and relationship, and were interpreted through the viewpoints of the researchers, it became critical that the study acknowledge its bias and indicated methods to improve the validity of the study. Researcher's reflexivity on the study and validity enhancement techniques are presented below.

2.4.1. Researcher reflexivity

As an student who did not experience undergraduate life in America, I was aware of my influence on the ways the data in this study were collected and analyzed. Coming from a developing country in Asia, I did not develop the habits of studying informal facilities similar to American students. Not only the curriculum for undergraduate in my country included limited collaborative learning activities, there were not many places where students could study outside the classrooms other than the libraries and their dorm rooms. Laptops, the indispensable tools for learning “anytime anywhere”, were not popular among students in my country in the early 2000s either. Using informal campus spaces for academic activities such as doing homework, doing class projects etc. was a rare activities for me and my friends during the undergraduate years.

Being in America for a graduate degree, I was assigned a small cubical workspace. Thus, I did not have to find spaces on campus to rest between classes like many undergraduate American students. I did not participate in study nights at informal
learning spaces on campus either because I lived far away from the campus. In other words, I did not use informal learning spaces as much as ordinary American undergraduate students.

When choosing the population for this study which included students who studied in informal spaces, I was aware of myself as an outsider of the phenomenon. Being an outsider had advantages and disadvantages. First of all, I was driven to learn more about new things such as the ways American students use informal learning spaces. This helped me overcome the tiredness during observation and interviews, and helped me to be curious and energetic throughout the research project. Secondly, as an outsider, I received a lot of help from friends and acquaintances to explore American undergraduate culture. This was reflected in the snowball sampling technique for participant recruitment that I employed in this study. Participants were very willing to help me to identify the next persons for interview. They were also very eager to tell me about their ways of learning and using informal learning spaces. The disadvantages of being an outsider were that my encounter and interpretation of the data could be limited by my own experience with informal learning spaces. I was aware that other researchers who were insiders to the informal learning space phenomenon may discover aspects of informal learning spaces that my limited access to informal learning spaces and people might not reveal.

For these reasons, it becomes essential for me to acknowledge that this study is bias with a foreign student perspective. Readers of this dissertation should be aware of the bias as they evaluate the quality of the research.
2.4.2. Validity enhancement

Because the ways data were collected and analyzed were bias, various techniques to enhance its validity were employed.

2.4.2.1. Direct experience

My first method to enhance the validity of this study was to try to experience learning the ways my American college student participants did. I managed to imitate activities that my participants performed informal learning spaces. I went to places that the student participants recommended during the interviews and tried to study like they did. I hopped over to the study nooks, buried myself in the carrels behind the bookshelves, checked into study rooms, and invited friends over for a study night in the libraries or in the student commons. In other words, I was trying to live the life of my participants.

Three months of collecting data went by fast. As I tried different places, I developed preferences for some places more than others. I also became aware of environmental factors embedding in each place, and had a quite clear idea of my ability to handle environmental distractions in each location. In the end, as I completed collecting data and stopped frequenting the different informal learning spaces on campus, I realized that I missed going to these places to study. I realized that I missed the buzzing noise, the crowd, the social atmosphere, and the fun time studying with friends. Yet, I got to know the environment of informal learning spaces and in return, the environment of informal learning spaces influenced my learning behaviors. I thought I had adopted new learning culture and had also adapted to environmental factors, especially the distractions.
at informal learning places.

2.4.2.2. Data triangulation

The second technique that I employed to improve data quality was data triangulation. I employed three sources of data to inform my understanding of informal learning spaces: observation, interview, and auto-photography. Data from observations were used to inform interviews and vice versa. These data were also triangulated with the information from auto-photography where I asked the participants to describe the photographs they took about informal learning spaces per my request.

With the triangulation of data, I was able to verify if certain behaviors truly existed. For example, when I realized that students tended to gather toward one side of the rooms, I thought at first they were attracted to the windows which were only available on that side of the room. However, as I interviewed several students studying there, I realized that the students gathered toward that side of the room because of the availability of power outlets. The photographs that the students took also showed me that power outlets were critical to the liking and the selection of seating.

2.4.2.3. Member checking

Member checking was essential to make sure that my interpretation of the data were close to the interpretation of insiders. I gave the manuscript of the findings to two undergraduate friends who happened to take part as participants in this study. On giving them the manuscripts, I specifically asked them to evaluate my descriptions about student learning behaviors, my interpretation of such behaviors, and the exhaustiveness of the reasons to choose informal learning spaces that I identified. The students reported that in
general, I had accurately described the learning phenomenon. They also advised me to include more details about the needs for refreshments, outlets, and nap spaces. Their advices and comments were used to reinvestigate data interpretation which resulted in the addition of the category named “nap space”.

2.4.3.4. Comparative analysis

The forth method to enhance validity was to emphasize on comparative analysis. Comparative analysis is a critical procedure in developing grounded theory (Glaser & Strauss, 2009). “By comparing, the researcher is able to do what is necessary to develop a theory more or less inductively, namely categorizing, coding, delineating categories, and connecting them” (Boeije, 2002, p.393).

Specifically, I compared informal learning spaces within each building to identify the similar and differences in design and student behaviors. For example, I compared the designs of various informal learning spaces inside a student center and student behaviors there. These informal learning space differed in size, furniture, amenities and crowding even though they were within one single building. This gave me an idea of how the design of each informal learning space could affect student behaviors. Next, I compared the design of informal learning space and behaviors of students across 10 buildings. This provided me with an idea of how features pertained to each building (e.g. management) could affect student behaviors.

Additionally, I compared the similarities and differences among facts or pieces of data before coming up with empirical generalization. For example, some students reported that they enjoyed buzzing noise while studying while other reported that they
enjoyed quietness. Rather than concluding that students had various interest in background noise, I carefully examined the context in which the students mentioned their preferences for background noise. After examining the context, I realized that the students were referring to different learning occasions, one was doing home work and the other was preparing for exams. This suggested me to reorganize the codes into categories to reflect the impacts of learning tasks upon background noise preferences.

2.4.3.5. Thick description

The fifth method to improve trustworthiness of the data was to provide a thick description of behaviors and activities happening in informal learning spaces. Thick description focuses on capturing various aspects of the meanings and experiences that have occurred in a situation (Denzin, 2001). This includes reporting “meanings, intention, history, biography and relevant relational, interactional, and situational process in a rich, dense, detailed manner... to take the reader to the heart of the experience being studied” Denzin (2001, p.162).

Specifically, I tried to provide as much information as possible about the university and the research sites to contextualize the study. For this reason, I included a section in the findings to describe the selected university with its architecture, space planning, regulations, management, and budget. I also described the research sites in details including the architecture of the building, their goals, the ways informal learning were managed, and the ways students used informal learning spaces in each building. This information helped me to establish the context of the study and identify aspects that pertain only to the university under investigation.
Chapter conclusion

The method chapter is a window to understand the data. Because this study used qualitative approach, especially grounded theory from case studies, the data collection and data analysis were much influenced by my own background, relationship, and experiences. To minimize my own influence on the study, I employed multiple techniques in data collection and data analysis to verify the data. I also critically reflected my own standing throughout the study. The method chapter, therefore, becomes critical to evaluate the quality of the whole dissertation.

Chapter summary

Using grounded theory to frame the study, I aimed to discover commons factors that today's college students referred to as they made the decision to choose informal learning spaces to study in their own time. Data were collected through interviews with 42 college students, two facility planners, two designers, four administrators, and four professors. The interview data were triangulated with my observation data at informal learning spaces, which were collected in 10 different campus buildings and supplemented with photographs taken by the participants and myself. Data were coded using TAMS, a qualitative analysis software, and further synthesized to form categories, relationships and hypotheses. Based on the categories, I developed a model to explain the choice of informal learning spaces of college students in the digital age. I also used various techniques to improve the validity or the trustworthiness of this study.
CHAPTER THREE: FINDINGS

Chapter introduction

This chapter presents the findings related to the research question, namely how Net Gen college students select informal learning spaces. Before going into the details of the informal learning space choice model, it is essential to provide a description of participants and research sites. Because this study relies of qualitative information, the description provides contextual information to locate the findings in this study.

The findings are presented in three major headings: a description of participants, a description of research sites; and the informal learning choice model. Accompanying the informal learning choice model are examples from the interviews where students expressed their opinions about the roles of various factors in their choice of informal learning spaces.

3.1. A description of participants

3.1.1. Participant demography

A total of 54 people participated in the interviews. This included 42 students, two facility planners, two designers, four administrators, and four professors. The majority of student participants was female (24/42), undergraduate (38/42), and under the age of 24 (38/42). Many students majored in biology and related fields (12/42). All facility planners
and designers participated in the interviews happened to be female with more than five years of experience in campus planning and educational facility designing. Two out of three administrators were female with 5-year experience. Among four professors participated in the study, three were from College of Education and the other from the School of Agriculture. All professors happened to be male. More details about participant demography in this study could be found in table 2.

Participant demography indicates that the study fairly represents American college student demography in which female accounted for 57% enrollment to higher education in the past decade (U.S Department of Education, 2013). The study also better reflects the voice and learning behaviors of undergraduate students in choosing informal learning spaces. The problems of gender in the demography of designers, planners, and professors are not an issue since the total number of participants is relatively too small to have a representative effect. The interviews with designers, planners, professors, administrators also focused on professional issues which are not highly influenced by gender factor. Table 2 summarizes participant demography by showing the number of participants per age, gender, level of education, and major.

Table 2

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Students</th>
<th>Professors</th>
<th>Facility planners</th>
<th>Designers</th>
<th>Administrators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number per profession</td>
<td>42</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Age 8 - 24 years</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Age Group</td>
<td>Count</td>
<td>Under 10</td>
<td>10-19</td>
<td>20-24</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>----------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>25 to 34 years</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 or older</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Count</th>
<th>Under 10</th>
<th>10-19</th>
<th>20-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Count</th>
<th>Under 10</th>
<th>10-19</th>
<th>20-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some college</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>4</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major</th>
<th>Count</th>
<th>Under 10</th>
<th>10-19</th>
<th>20-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biochemistry, Biology, Nursing, Chemistry, Radiology, Bioengineering</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business, Accounting, Economics, Management, Finance</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering, Computer</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.1.2. Student profiles

In order to provide a descriptive image of current college students participated in this study, three student profiles were created based on the information about typical college students that I collected in this study. Each profile illustrated a student with his or her needs, relationships, and ways of using informal learning space. Using the course of a day as the frame, each student profile is presented below in his or her sequence of daily activities.

3.1.2.1. Profile 1

Jane was a junior student in department of Biology. Living at the residence hall 500 yards away from her department's academic building, Jane usually walked to classes. Like many ambitious students, Jane tried hard to be a “cool” college student; she played hard and also studied hard. In other words, Jane wanted to maintain good academic score while remaining active, athletic and sociable.

In the morning, she and her roommate often visited the Paleo Student Center for a cup of Starbucks coffee. Then they separated to attend their different classes. By lunchtime, Jane went back to the residence hall for lunch, where she met with other students living in the same hall. They chatted about going to the student center for a study
night, an activity designed for students participating in the same Greek house. After another class in the afternoon, Jane headed back to the residence hall, where she found several other students living on the same floor hanging out at the floor's lounge. She joined them for half an hour, chatted about her day. Another student joined the conversation and spread her books and her computer on the sofa and the table.

At night, Jane and several other students in the same floor went to the Neo Student Center for a study session. They arranged tables at the dining area of the student center together to make seating for about 20 people. They all pulled out their own homework, notebooks, books, and laptops and worked on their own task while sharing conversations here and there.

On occasion, when Jane had a group project with other students from her residence hall, they often used the floor's study room with a conference table and white board instead of the one with soft seating. While Jane took notes, other students took turn to share their ideas on the board. For group projects with students who did not live in the residence hall, Jane often came to the study room in the library. The study room was very comfortable, private and quiet enough for group discussion without being bothered by the surrounding crowd in the library commons. If they did not find any study room available, they used one large table in the common of the library for discussion.

Sometimes, Jane preferred studying by herself at one of the carrel by the bookshelves on the second floor of the library. She said,

“I usually go there [the library] when I need to finish something. The floor lounge is too distracting to do that. I sometimes go Nook Hall to study too. I like sitting at the corner overlooking the campus. It is nice and quiet there.”
3.1.2.2. Profile 2

Frank, Jane's classmate who lived off-campus, often visited one of the student centers during lunchtime. He preferred the Paleo Student Center because it was closer to his classes. However, the Paleo Student Center was usually packed at lunchtime. Several times, Frank had to walk further to the Neo Student Center to find an empty seat. He often acquired his own table at the dining area; however, he was willing to share the sofa with other students. He found Mimi, his classmate, buying lunch in the dining area. They shared a few words, and then Mimi headed to her classes while Frank stayed at the student commons to do homework.

3.1.2.3. Profile 3

In fact, Mimi was early for her class. It started at 3 p.m. but it was only 1:30 p.m. right now. Mimi was sitting on the floor of the corridor outside her classroom, leaning her back against the wall. She plugged her computer into one of the outlets on the wall, which was originally designed to supply electricity for cleaning equipment. She opened her Facebook and email, read some news on the web, and then decided to complete the class-assigned reading materials that she had downloaded from the course's learning management website the night before.

“It is very crowded in the student commons,” she said. “I need a tranquil place to rest before the next class.”

“I saw some students taking a nap in the student commons,” I challenged her.

“Ha ha. I saw them too. I don't feel comfortable doing that,” she laughed.

Sometimes Mimi and her friends did a study night at one of the student commons.
“You know, those study nights,” she said, “you don't really study at all.”

Peter, her classmate, also arrived early. Mimi lifted her head to look at Peter as a way of greeting and then went back to her laptop. They said nothing. Peter pulled out his phone and started scrolling.

“What are you doing?” I asked.

“Nothing,” he replied. “I'm just waiting for class.”

Soon some other students arrived. They kept quiet so as not to affect another class in session. Liz and Megan were sitting in the middle of the walkway looking at the laptop together. They were reviewing the PowerPoint for their presentation that was scheduled to happen in minutes. John was standing against the wall. Jeff was just watching people.

“It is the etiquette of the hallway,” Mimi commented. “Everybody is respectful and quiet.”

3.2. A description of research sites

To provide a context for my findings, it is essential to provide a thick description of the selected university and its informal learning spaces. To do this, I present the findings from general to specific, describing the campus at large and then presenting the informal learning spaces that I selected as the research sites. The description would not be complete without a picture of the users of informal learning spaces, Net Gen college students. All this information establishes a clear image of the campus under study and provides context for the analysis of Net Gen college students' interactions with environmental factors and their reasons for selecting certain informal learning spaces for study.
3.2.1. The Green Field Campus

Green Field University, the case study university, is a typical American state-owned university. Established in the 1800s, the university was designed on an open green field. The early buildings were formed along an open courtyard, creating the historic district of red brick halls. The main administration building is at the top of the green field, where once stood the first academic building. In later years, the campus expanded in all directions. Nevertheless, the green field courtyard remains a place for hangouts and campus ceremonies.

The oldest buildings were constructed along the courtyard in red bricks, since the 1800s. The next phase of construction, which began in the 20th century, formed the Limestone campus, consisting of many Neo-Gothic architecture buildings in white limestone. The increase in enrollment in the mid-1900s led to the construction of many academic, medical, science, administrative, and student-living facilities in the south and west of the campus and surrounding area. From 1985 to 2001, the university witnessed the peak of its construction with 108 new buildings, the ongoing design and construction of 100 structures, and planning of ten facilities. Enrollment also reached a record high of 34,748 students in the 2012 to 2013 school year.

Ensuring appropriate infrastructure to support innovation, excellence in teaching, research, outreach, and economic development was one of the targeted goals of Green Field University, along with the expansion and strengthening of study programs worldwide and building interdisciplinary programs. However, the rises in enrollment and maintenance issues coupled with the decline in state funding have made it challenging for
the university to achieve its infrastructural goals. The budget problem affected Educational and General space the most. Many historic buildings, especially those built in the early 1900s, were in need of renovation to avoid deterioration and to provide improved accommodation for new ways of teaching and learning. The full renovation of campus historic buildings began about 10 years ago but progressed slowly. The director of campus facility planning at Green Field University explained,

“When we started this process, there were 34 buildings now there is 30 on the list, and that in the course of 2007 is when we started the process. You know it is a good process but it is a little money in relationship to our big chunk of space.”

In order to meet the university's learning goals, which focused on both the fulfillment of course requirements and the promotion of inquiry learning, effective communication, society outreach, diversity experience, and construction of informal classroom spaces (learning spaces or places for students to study outside the classrooms) and formal classroom spaces were needed. According to the director of campus facility planning, requests for informal learning spaces began to increase about 10 years ago. However, depending on funding sources, different campus facilities responded to the needs in their own ways. Auxiliary spaces, such as the student center, bookstore, and residence hall, that were able to generate their own income through student fees, purchases, and rentals had more flexibility in providing informal learning spaces for students. They also had their own design and construction team who quickly recognized their main customers’ (the students’) needs for learning spaces and devised plans to accommodate those needs. For example, student affairs had been renovating the student
centers with new seating and laptop access. Educational and General (E&G) spaces, such as academic halls, libraries, museum, etc., which relied on fund allocation, struggled with the rise of enrollment and maintenance, and the decline of state funding. Priority spending in E&G buildings was given to maintenance and promoting the host department’s academic missions. The director of campus facility planning explained to me during the interview,

“I would not say that there is a particular vision (about informal learning spaces). It is a little bit intangible. It depends on the opportunities. There is no one main goal of the University in terms of space right now. Our main goal is to renovate the facility that are failing... In terms of academic buildings, what we are trying to accommodate is not necessary significant informal learning areas but bit and pieces.”

3.2.2. Informal learning spaces in four types of facilities

Ten buildings were selected for investigation in this study. Each building consisted of informal learning spaces with unique designs and regulations. By selecting these buildings, I determined to understand how the differences in the design and management of each informal learning spaces influence the way students selected and used these informal learning spaces.

Table 3 summarizes the uniqueness in design and usage of each building.
Table 3

*Building Features and Usage*

<table>
<thead>
<tr>
<th>Buildings</th>
<th>Design features</th>
<th>Student usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student centers</strong></td>
<td><strong>Paleo Student Center</strong></td>
<td><strong>Crowded</strong></td>
</tr>
<tr>
<td></td>
<td>Old, large, has a variety of informal learning space including nooks, lounges, dining facilities.</td>
<td></td>
</tr>
<tr>
<td><strong>Neo Student Center</strong></td>
<td>Old, large, has a variety of informal learning space including nooks, lounges, dining facilities, study rooms, booths, carrels. Neo Student Center has more types of informal learning spaces</td>
<td><strong>Crowded</strong></td>
</tr>
<tr>
<td><strong>Libraries</strong></td>
<td><strong>Mega Library</strong></td>
<td><strong>Crowded</strong></td>
</tr>
<tr>
<td></td>
<td>Old, large, is the main library, has a variety of informal learning space including carrels, large tables, mini-lounges, booths computer counters.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Section Library</strong></td>
<td><strong>Not as crowded as Mega Library</strong></td>
</tr>
<tr>
<td></td>
<td>New, small, is a departmental library, has less variety of informal learning space than Mega Library however is more quiet.</td>
<td></td>
</tr>
<tr>
<td><strong>Residential halls</strong></td>
<td><strong>Has pathway that connect the two residence halls, has various informal learning space including study nooks, lounges, study rooms</strong></td>
<td><strong>Accessible by residents only</strong></td>
</tr>
<tr>
<td><strong>Academic halls</strong></td>
<td><strong>Limestone Hall</strong></td>
<td><strong>Has students sitting on the floors</strong></td>
</tr>
<tr>
<td></td>
<td>Old, has no designated informal learning space</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Bridge Hall</strong></td>
<td><strong>Loved by students</strong></td>
</tr>
<tr>
<td></td>
<td>Old, was recently renovated to add</td>
<td></td>
</tr>
</tbody>
</table>
Box Hall
Old, has a student resource room in the basement which is outfitted with study booths, mini-lounge, tables and printing service.

Deserted

Nook Hall
New, has large corridors which are outfitted with study nooks (e.g. study booths, sofa and window benches).

Loved by students

### 3.2.2.1. Student centers

Student centers offered the most variety of informal learning spaces for students. Two student centers selected in this study, the Paleo Student Center and the Neo Student Center, both provided meeting rooms, dining facilities, technology centers, an event host, offices, and informal study spaces. Constructed in early 1900s, the Paleo Student Center served as the community center for many years. The building had two wings connected through a clock-tower bridge. The bridge itself was fitted with several armchairs and a table, making it a mini-lounge. Away from the dining facilities, the lounge was quite tranquil. Students were found engaging in group projects at the tables, reading books on the arm chairs by the windows, or taking naps. On the second floor of the North wing was another lounge with a large set of plush furniture - a sofa and some armchairs. Similarly, students made use of this lounge for socializing, doing homework, resting during between classes, or taking a nap. Most of the time, one could see a group of students sitting together. They could be study partners or strangers sharing the couches. Downstairs in the dining area, also known as the commons, it was very crowded and noisy. Students gathered there between classes for coffee, food, or to study between or

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after class time. During lunch, it was very difficult to find an empty seat. Students ate, talked, napped, and stretched their legs over chairs and ottomans, all while sitting opposite strangers. After dinner, when the dining facilities were closed, students turned the dining areas into a self-study and socializing space. A professor remarked about student behaviors in the common area like this:

“They are often alone. When I come to the union, I often see one student with a computer at a table for 4 people. If there is more than one person at the table, they often have the cell phone on or their laptop on. So they are linking to the outside world but not concentrate on the ground that I'm being here with them...They are together but they are not linked.”

Figure 7. Alone Together in the Student Commons

The professor's remark is easily depicted in figure 7, in which five students can be seen sharing a table (with one student behind the lamp). However, these students were
busy with their own activities. Three of them were using their laptops, the man on the left
corner was using his phone, and the other female student was writing in her notebooks.
These students were not friends with each other. In fact, they were strangers sharing the
common space in between class hours.

Compared to the Paleo Student Center, the Neo Student Center was newer and
almost twice as big. Constructed in 2010, the Neo Student Center provided 229,000
square feet of space for offices, a bookstore, a computer store, banking services, dining
facilities, meeting rooms, lounges, and study rooms. The building was designed around
an atrium, with peripheral offices and stores. In the middle of the building were the
dining facilities, also known as “the commons”, which was twice as big as the one in the
Paleo Student Center. “You can always find a place to sit here,” said one student. Many
students went to the Neo Student Center to study to avoid overcrowding at the Paleo
Student Center. The commons provided configurable tables and chairs, which were used
by the students for dining, group work, or self-study. It also provided study booths along
the walls and the middle pathway that offered students some privacy, comfort, and power
outlets for long hours of studying. The study booths were the most sought-after seating
in the Neo Student Center. Many students recommended that these study booths be
provided in the Paleo Student Center too. The designer and manager of both student
centers commented,

“You sit at a booth and we provide you a table and power, and they (the
students) can be there all day. And we install more of that in the corridor
of the quiet area. The day after they are installed they are immediately
packed, and they are still packed. And we have SISC approval to install
more, so we will install them down in the other corridor.”

The Neo Student Center also provided more quiet study space. The second floor and the basement of the building were equipped with sofas and study carrels. Many students resorted to the basement lounge to take naps and use the second floor lounge to get away from the noisy commons. However, they also found the lounges too comfortable and too dim to stay awake to study. Many students would rather put up with the noise in the commons for the usage of table and chairs, which were more suitable for studying activities. The study rooms were located on the second floor; each provided a large conference table, chairs, and a whiteboard for students to work in groups.

Students in both student centers were very concerned about the availability of power outlets. Even though many outlets were installed on the floor of the second floor lounges, it seemed that the need for more power outlets were a great concern in the dining area where students used the dining tables for dining and study. However, the designers and managers of both student centers were hesitant to install more outlets in the dining area for fear of obstructing circulation, services, and overcrowding.

Figure 8 shows a typical use of the commons area in the Neo Student Center. The tables were originally designed as dining furniture; however, as seen in the photo, many students used the tables to study in groups, pairs, or by themselves. From the photo, it seemed that college students preferred working in groups of two. Students spread their learning materials on the tables and many of them had laptops while studying. The middle of the photo depicts that larger tables were occupied more than the smaller tables.
3.2.2.2. Libraries

Libraries are traditionally places designed for academic learning activities outside the classroom. For many students in this study, libraries sounded more formal than student centers. Thus, studying in the libraries was often reserved for serious study activities such as completing an assignment, researching, or preparing for an exam. However, there have been many renovations in library space to accommodate the needs for collaboration and teamwork. Both libraries in this study provided a variety of learning spaces outside the classroom.

Mega Library was built around the same time period with the Paleo Student Center. Thus, it shared the same Gothic architectural design and white limestone wall. However, the two buildings were not in one complex but just nearby each other. Mega
Library served as the main library of the university. It had five floors with one cafeteria in the basement, a learning commons on the first floor, bookshelves, quiet study rooms, quiet study lounges, and quiet study corners on the upper levels. The learning commons was recently renovated: bookshelves were removed, leaving space for lounges, large conference tables, small tables, computer stations, and study booths. Study rooms were located at the back of the learning commons along the south walls. Computer stations were arranged in a circle, scattered by large round tables. This provided a good setting for collaboration among students. Students were allowed to talk in the learning commons but they were not as loud as when they were in the student centers. Students could have snacks at the cafeteria; however, they were not allowed to bring food or un-lidded water containers to the upper floors.

On the second floor, the library provided quiet study spaces. Two large rooms were equipped with many large rectangular tables where students spread their materials as they focused on their work. Students tended to sit on tables closer to the outlets. Study carrels were provided along the windows next to the bookshelves, offering the utmost privacy for those who needed to be alone to complete their work. Small lounges were also found in the middle of the bookshelves, offering cozy quiet spaces to read books and do homework.

Figure 9 shows the typical scene at the quiet floor in Mega Library. Individuals, pairs, and groups of students occupied different tables to study. There were no communication sounds, as the quiet floor did not permit conversation. However, due to the poor noise insolation of the building, echoes of noise from turning pages, typing computers, and people walking were very obvious.
Compared to Mega Library, Section Library was a departmental library and much smaller. The library was built in the 1980s, occupying 50,000 square feet inside an academic building. The library spread across three floors, consisting of computer space on the first floor, large tables and study carrels on the second floor, and study rooms, book stacks, and more tables and carrels on the third floor. Many students liked Section Library more than Mega Library because Section Library was smaller, cozier, and had many large tables. When I asked them about both libraries, most students complimented the private learning spaces at both facilities.

The favorite pieces of furniture in Section Library were the study carrels. Students favored Section Library's study carrels because they had bigger table spaces. On average, an individual carrel in Section Library was one and a half times larger (approximately 30' x 50') (see figure 10) than the one in Mega Library (approximately 22' x34') (see figure 11). Some of the carrels in Section Library had electrical outlets attached to the table.
surfaces, making it easy for students to use their laptops (see figure 10).

Figure 10. Carrels in Section Library

Figure 11. Carrels in Mega Library

Students were allowed to talk in Section Library, but most of them kept their voices low to respect other students who were studying. Section Library also had study rooms available by request. Most of the study rooms were reserved for formal academic
classes and official meetings. A few study rooms on the third floors were available for reserve by students. Even though Section Library was a departmental library, students from other departments were also seen using the learning spaces.

An administrator at Section Library commented, “the students usually pass our library on their way to Mega Library, so they end up here because we are much closer”.

### 3.2.2.3. Residence halls

To the East of Neo Student Center, there was a complex of two recently renovated residence halls connected to each other through a walkway on the ground floor. The designer of the residence hall complex described the heavy usage of the walkway,

“This is an 880 student facility, with two buildings that use this space. In this case, we know that it opens to students from outside as well because we have the dining area on the 2nd floor and the classrooms as well.”

Recognizing the walkway as a hub of traffic for students, the designer decided to convert the circulation area into an informal learning area. The idea was to create a learning space within or adjacent to a social space. The entrance door divided the walkway into two areas: one was outfitted with tables, chairs, and soft seats, and the other with computer stations.

The two residence halls were similar in design: each building had three wings, each wing had a study room, and the three wings shared one floor lounge. Each floor lounge was equipped with soft seating and a television. Some were also equipped with tables for students to do group work. A typical study-social time at a floor lounge could consist of three to a dozen students. The television was on, but none of the students were
seriously watching or seriously studying. While some were doing homework, others were chatting or doing nothing. Many students said that they only did casual study in the floor lounge. When it came the time for serious study, especially when they had to complete assignments, they would rather go to the student center or the libraries to be more focus.

Figure 12. A Residence Floor's Lounge

Figure 12 depicts a gathering at a residence floor's lounge. Seven students were sitting on the main sofas and another one was sitting on the chair behind. On the television, the movie *Gladiator* was on. Students were watching the movie and hanging out while completing their homework assignments. Two students had their books in front of them and another was using his laptop.

Study rooms were provided on each floor. Each was equipped with different types of furniture. Some rooms were outfitted with soft seating and others with tables and chairs. Each room had a whiteboard for students to take notes or brainstorm when they
were working together. Most of the time, study rooms were empty except during exam time. Students preferred study rooms with tables and chairs to those with couches. They also preferred study rooms with better views.

Random study nooks were also designed into the buildings at corners adjacent to the floor lounges, the kitchens, or the laundry and were very much enjoyed by the residents. The designer of the residence hall explained,

“We try to create a space similar to what people have at home, when maybe people are cooking something, or doing the laundry, they can work on some type of work: paying the bills or doing something, making phone calls and having their laundry done at the same time.”

3.2.2.4. Academic halls

Academic halls were mainly reserved for formal educational activities. Thus, the academic halls often consisted of classrooms, auditoriums, laboratories, office spaces, and spaces for circulation. Recent interest in informal learning activities made it challenging for campus facility planners to create them within academic buildings. The four buildings selected in this study were representations of different ways informal spaces in academic buildings were designed, renovated, and used. These building were Limestone Hall, Bridge Hall, Box Hall, and Nook Hall.

**Limestone Hall**

Limestone Hall was one of the old buildings that had not gone through renovation. Constructed in the early 1900s in Gothic style, Limestone Hall boasted three floors of classrooms along narrow hallways. There was no space large enough to create a
mini lounge, except the one beneath the stairs. Nevertheless, even that space was stacked with unused, dusty tables and broken chairs. Students were often found sitting on the floors waiting for classes (see figure 13). At peak hours, there were probably more than 20 students hanging out in the hallways. Some were standing against the wall, some were talking, some were sitting on the floor working on their computers, and some were laying papers and notes on the floors.

Figure 13. Studying in the Hallway

Bridge Hall

Located right behind Limestone Hall, Bridge Hall was built in the same era with Gothic architectural style. A recent renovation at Bridge Hall in 2008 connected it to an adjacent building block with a bridge that was large enough to outfit a lounge for faculty, staff, and students in the building (see figure 14). A ramp separated the walkway from the
lounge area, where there were two tables and a couple of armchairs. Most armchairs were arranged by users to face the floor-to-ceiling window that overlooked the beautiful scenery of Gothic buildings on campus. There was also a kitchen with a sink, a microwave, a water fountain, and some indoor plants.

Figure 14. *A Study Bridge*

Figure 14 shows how students used the bridge for learning activities. A female student turned her seat toward the window where she could view the beautiful campus scenery while typing on her laptop. The chair next to her was also turned toward the window. This indicated that the students were very interested in windows and would rather sit facing them. In the corner, a group of three students was studying together. A male student seemed to be seriously thinking as he read something from this laptop. The other two students were also very attentive in what they were doing as they did not seem to be communicating in the photo.

A graduate student described how he and his colleagues used the lounge space:
“I actually really like this bridge. I actually get everything done. I could talk to other graduate students and collaborate. You can have fun. You can have a lot of social events. If the department hosts someone, we basically come over here. I would say well. I got an interview here for my Ph.D. This thing has a special attachment for me. One of the first labs I did research in was right here. For lunch it is obvious for everyone to come here. The place is not too loud, you know, so everyone in the lab just comes here.”

Another student said,

“I am not a student in this department. But one time I visited a friend over here and discovered this place. Since then it became my favorite place. If I have classes nearby, like today, I would come over for an hour or so in between to relax. It is much better than the student centers. So crowded there.”

**Box Hall**

Box Hall was constructed in 1958 and the design was influenced by utilitarian campus styles that was prominent after World War II. The building was windowless. However, it was fully air-conditioned, and automatically ventilated. Recent renovations at Box Hall turned an office into a student resource room (see figure 15). To enter the student resource room, one walked down to the basement, turned right and then left, and walked pass the closed-door offices until seeing a room labeled Student Resources Room. The room was well-lit and outfitted with contemporary furniture. A black-leathered couch was placed near the entrance together with several white round stools. Four study booths
were located at the corners of the rooms. Each had a tiny round table and soft seating.
The tables were extremely small, but large enough for several bottles of water. In most of
my observations, there was no one inside the student resource room.

Figure 15. *A Student Resource Room in the Basement*

A student said,

“I sometimes go there for printing... but I would not study there or meet with
my group there. There are more airy spaces nearby. I would go to the Neo
Student Center, right across the streets.”

The lack of natural light in this building seemed bothersome to many students.
One student commented, “It was such an old building and it was a bomb shelter at one
point. There aren't many windows, so there are not much natural light. And for me,” she
continued, “I like more open space. When you are in Box Hall, you feel a little more
constricted and trapped in the space.”
Nook Hall

Nook Hall was a research building constructed in 2004 with an area of 230,000 square feet. The building housed 12 departments of life science research. The center provided collaborative space for research labs, as well as teamwork and social interaction space for staff and students. Along the sky-lit central atrium, many study tables and lounges were installed.

“There is a research behind the design of this building. The way it was located, the open spaces, the seating and the concept of putting in whiteboards. All of that has some scientific study behind it. It has some meanings into it,” said the manager of Nook Hall.

Figure 16. The Atrium
The building was designed to promote collaboration among different research labs. Labs were located on two main wings of the building and are designed to connect to one another, sharing conference tables in between so that researchers could come and share ideas and findings. In the center of the building, there was the atrium where a large spiral staircase connected five floors of the building. From the top of the staircase, one could observe circulation movements in the downstairs floors and even notice the displays of student products in the lower levels (see figure 16).

For students outside of the department, Nook Hall offered an escape from the noisy environment where they could find themselves secluded areas to study. On each floor, study nooks were placed in the corners of the atrium or along the stairs. The students enjoyed the comfortable sofa and booth-style seating, while having tables to write on and whiteboards to jot down their thoughts.

There was also an indoor garden behind the atrium where benches were set along the wall-to-ceiling windows. “No napping” signs were placed along the window benches to keep students from becoming too relaxed while they are in the building.

There were also conference rooms available by request for staff and students. One of them was open for public use. The news of its availability was scheduled to be announced to the students in the near future. At the time of the study, the conference room remained close and empty.

In summary, the comparison of architectural design and usage of informal learning spaces in ten buildings provided me with initial patterns regarding the ways current college students interact with the environment of informal learning spaces. Even
though the residence halls, student centers, libraries, and academic halls had different functions and designs, the way current college students responded to the environmental factors seemed to follow a pattern. The students paid attention to the setting of each informal learning space and the environmental factors they usually associated with each setting. More details about this interaction will be described in a later section. However, before going into the details of how students perceived environmental factors and used them in their choices of informal learning spaces, it was essential to understand the current college students of Green Field campus, whose ways of life influenced their use of informal learning spaces.

3.3. A model of informal learning space choice and interaction

The description of the Green Field campus, research sites, and profiles of current Green Field college students provided essential context to understand the students' choices of informal learning spaces. When it came time to present the relationship between students and the informal learning environment, this information acted as the ground to understand what were behind the behaviors of the students in informal learning places. To further understand their choices of place, I asked many students the same question: “Why are you here today?”

Although their reasons were varied, using Lewin (1951)'s person-environment formulation as the framework, I arranged their reasons into person category and environmental category, which were divided into sub categories named needs, learning tasks, environmental factors and management factors. The model of informal learning space choice and interaction is illustrated below.
The model consists of two main entities: college student and informal learning space (see figure 17). A college student is influenced by his/her own needs, identified in this study as the needs to balance academic life and social life to be a “cool” student, and the learning tasks. The student is also influenced by the nature of the learning tasks (serious, casual and random), each of which demands different levels of concentration. The student also consider the physical environmental factors (setting, noise, crowding, light, furniture, amenities, and location) and facility management factors (accessibility and control) as he or she chooses the informal places on campus to study.

Figure 17. Informal Learning Space Choice and Interaction Model
The process in which a student selects an informal learning space to study is described below:

1. First of all, the student reviews environmental factors at different informal learning spaces. During this process, the student evaluates the match between learning task, his/her own needs, and the perceived environmental factors and management factors in different informal learning facilities.

2. Next, the student decides which informal learning spaces that best match his/her needs. College student prefers informal learning spaces that offer a combination of privacy and sociability together with furniture, noise, crowding, light, amenities, and convenience. In other words, Net Gen college students tend to select semi-private learning spaces rather than those extremely private or extremely sociable.

3. After the student selects an informal learning space to study, the person may customize the learning space so that it becomes more compatible with the learning tasks and his/her needs.

4. After all customization attempts, the student may adapt himself or herself to the selected informal learning space.

5. Sometimes, the student alternatively goes to different learning spaces for a change.

Below, the model is discussed in details.

3.3.1. Needs

“What is considered a cool college student?” I asked a group of undergraduate
students hanging out at the floor lounge of a residence hall. My goal was to find out Their answers were clear: a cool student had high academic achievement while remaining socially connected with peers. Below are some of their answers:

“That’s a difficult question. Someone who can balance.”

“They have the grades and they also have fun.”

“Yeah. Not just studying all the time.”

“Doing the week work hard and on the weekend you could enjoy yourself.”

“Work hard and play hard.”

“I always try to make time to hang out with friends. We also try to get good grades.”

Getting to know the students' idealistic perceptions of themselves was critical for the study. The self-image of the student was the one that they were trying to be in their daily life. Their behaviors and activities probably were scheduled to make themselves the people they would like to be--cool students who studied hard and played hard. Their self-image contributed to their preferences and choices and this apparently included their choices when it came to learning environments. Keeping in mind that the students sought both learning and socializing opportunities during their free time.

3.3.2. Learning tasks

After class hours, students usually had time and freedom in their hands. It was up to them to use the time as they wished: to socialize with friends, study, or both. As this study focused on how students interacted with the environment as they studied by themselves after class hours, I tried to find out the types of learning activities that
students were conducting at different informal learning places when they had the time for themselves. The findings revealed that many college students found it important to match the informal learning places with the learning tasks as they chose the informal place to study. There were three types of learning that happened in informal learning spaces emerged from the data: serious learning, casual learning, and random learning.

3.3.2.1. Serious learning

Serious learning happened when a student decided to learn something for a purpose. The purpose could be preparing for an exam, completing an assignment, doing required readings, writing a paper, discussing a group project", etc. Given that serious learning often happened when students approached a deadline, they often opted for a rather private and quiet environment, which they believed helped them focus better.

For group projects, the students preferred a study room or a student commons where there were tables large enough to seat several people and spread out learning materials. Depending on the importance of the study tasks and their deadlines, a group of students may check out a study room or just collaborate in a lounge or student commons. For example, when it came to developing materials, finishing up group projects, or finalizing the presentations, most of the time students selected the study rooms. When it came to brainstorming or quick updates, many of them opted for the commons areas.

For individual learning, the choice of where to go to complete a serious learning task was more dependent on individual preference. Most students required a certain level of privacy when they wanted to seriously study. However, it was up to each individual to define privacy. For some students, privacy meant minimal distractions. These students
would rather be alone inside a study room or bury themselves in one of the carrels next to the bookshelves. For other students, privacy meant being in a quiet place with strangers. This was the case for students sharing the quiet area of the library to study. They would occupy one desk among dozens in the room and study their own materials while other students focused on their own materials too. Some students preferred to have some noise in their serious self-study time, but they did not want to be bothered by friends. It seemed that the students perceived privacy as being anonymous in the crowd. Thus, they would select the student commons, the lounges, or any crowded place, knowing that their friends usually went to different places.

For example, one student named Matt had an exam the following day and he needed to review the class materials in order to perform well in the exam. Matt wanted to spend his time on the learning materials; thus, he needed to stay away from unnecessary distractions. He decided to find a secluded place in the library to complete the review of learning materials. His classmate Susan also needed to prepare for the same test. However, Susan disliked the library's atmosphere. She found it “uneasy and stressful.” “Too many people intensely working made me nervous,” she said. She enjoyed the buzzing business of the student commons but she did not want to be distracted by friends. She decided to go to a different commons where many of her friends did not gather. After all, the ability to complete the serious learning task was the most important factor in choosing a learning place for serious learning.

3.3.2.2. Casual learning

Casual learning, as named by many students in the interviews, was everyday self-
study after class hours. For casual learning, students did not have to compete with the
deadline, but they wanted to maintain the frequency of learning so that they “at least learn
something” and don’t spend all their time just playing around. Casual learning was also a
good time for students to show that they were “cool college students” because,
undertaking casual learning, the students found themselves working toward improving
their academic record while socializing with friends.

Typical casual learning took place in the evening where students gathered to do
homework, practice exercises, and reading assignments. Many students even scheduled
certain nights in the week for casual learning with friends. Some of them even got
together four to five times a week to do homework. Their destinations were usually some
tables in the student commons because there they could sit many people and talk, laugh
and snack at the same time.

For example, Laura and her best friends had a study night at the Paleo Student
Center. It was 7 p.m. and they decided to occupy the lounge on the 2nd floor. Laura put
her backpack down and made herself comfortable by putting both legs on the sofa. She
then pulled out her laptop as she communicated with her friends across the sofa.

“Do you know what happened in my class today? Tom fell asleep in the
middle of the lesson, and the teacher caught him.”

“Really. Is that Tom G., who is a friend of Ed?”

“Yeah. That’s him”

The conversation went on for about 15 minutes before any of them began to divert
back to their own study tasks. Laura was surfing her laptop while one friend was writing
in some notebooks and the other friend was scrolling her smartphone.
“How productive is tonight's study?” I asked.

“Not very productive!” they answered simultaneously.

“Yeah. At least, here I open the textbook and read them. If I were at home, I would belying in bed watching TV,” said Laura.

“How often do you study together?” I asked.

“Several time a week. We try to do it as often as we could.”, said Laura's friend.

For many students, casual learning was more for socializing than for studying. It was about getting out of the house, hanging out with friends without forgetting to do your homework. In other words, casual learning in informal facilities on campus were the way current college students stayed “cool” as they kept updated with events and completed academic requirements. Going to the library for casual study was not much different than going to the student commons in terms of purpose. “They [the student commons and the libraries] are both good places to stay updated with friends,” said one student.

The main difference between the two locations was the library learning commons was quieter than the student center commons. And “being in a more quiet place, we tend to lower our voice, make less conversation, and focus more on our homework,” said another student.

Depending on the size of the group and the subject of learning, for the bulk of the study time, students either became very communicative or remained silent. For instance, a group of four or more students were very noisy as they engaged in discussions. However, a group of three or fewer was much quieter. Students who studied different subjects were mostly quiet with chitchat here and there. Students who came to the student centers for casual study alone barely engaged in any conversations with the surrounding
people.

However, casual learning in the commons area had benefits. Students had the opportunity to help each other during the study time. They exchanged information, discussed a concept, and tested each other. A student described the benefit of her casual social study,

“Once every month, me and my classmates meet together to study French. It is really helpful. We would play a vocabulary game together. On person reads the word in French; the other says it out in English. I usually learn a lot of new words after the group study.”

Even when the students were studying with friends from different majors, or studying alone, it was easy for them to find somebody in the same class among the crowd in the student commons. A student commented,

“Many of my classmates study here too. When I have a question, I just call across the room, ‘Hey, what do you think about this concept?’ And I get the answer I was looking for.”

3.3.2.3. Random learning

Apart from serious learning and casual learning, students sometime found themselves using learning materials when they were waiting. This was considered random learning. Random learning could happen in the student commons or right outside the traditional classrooms, in the corridors, or at the lounges. On occasion, students engaged in random learning found themselves not wanting to communicate, so they would kill waiting time by reading class materials. This commonly happened at the
lounges and commons during lunchtime or time between classes, where strangers would share the sofa without communication. The most popular sentence used by students during this time was “Do you mind if I sit here?” Then each student went back to his or her own business.

Random learning in the corridors of academic halls was similar to in student centers, albeit with much less comfort. The students had about an hour or less before class and decided to be in front of the class rather than hanging out at the student centers. “The student center is too relaxing. And when you begin to do something, time goes by fast. Then when you decide to leave, you recognize that you are late for the coming class,” one student commented.

Sometimes the students needed to do quick reviews right before class, so they randomly did “last-minute learning”. The last-minute learning often took place in the corridor of their classrooms. Most of the time, students would learn something related to their upcoming class while waiting. Because the learning activities were “just reviewing the reading”, “going through PowerPoint”, or “retouching their assignment”, they did not require a lot of attention and effort.

In summary, accounting for individual differences, many college students seemed to link places with types of learning activities that they could perform: libraries and study rooms for serous learning, lounges and commons for casual learning, and the academic hall corridors for random learning. It seemed that students were well aware of distractions in each informal learning place and of their own ability to handle these distractions. They seemed to be aware of the amount of effort needed for different learning tasks and tried to leverage their efforts and their ability to handle distractions to make the best choices of
where to go. The students tended to link informal learning places with certain learning activities: libraries for serious learning, student commons for causal learning, and the corridors for random learning. This led to findings on “What are the environmental factors of informal learning places that determine students' choice of an informal learning place?”

3.3.3. Environmental factors

“What do you like and dislike while studying at this place?” was one of the questions I asked the college students who participated in the study. This was followed by another question, “Why do you come here today but not somewhere else?” The answers were varied depending on individual preferences and the unique design of each informal learning place. Some liked the buzzy noise, some liked the privacy, some liked the refreshment, some like the furniture, and etcetera. Their likes, dislikes and reasons for “being here” were noted then classified into seven place-choice indicators that related to environmental factors: setting, noise, crowding, lighting, furniture, amenities, and location.

3.3.3.1. Setting

For the purpose of the study, setting was defined as the overall atmosphere in each informal learning place. From the data, I identified three types of setting that existed in informal learning places with regard to the efforts and attention needed to complete learning activities: social-oriented setting, private-oriented setting and semi-setting (the space that combined elements of both social-oriented setting and private-oriented setting).
3.3.3.1.1. Social-oriented setting

Social-oriented settings were available in places such as the commons in the student center, the commons in the library, the lounges, the hallway and other gathering areas on campus. Given social-oriented settings aimed at promoting interaction, it was designed to allow conversational noise, group seating, and amenities for casual hangouts (refreshment, Internet, etc.). There were two prominent features of social-oriented setting: noisy and crowded.

Figure 18. Social-oriented Setting

On average, the student commons at the Paleo Student Center and the Neo Student Center produced noise levels at around 62 dB, which was typical for conversational noise environment. However, the student commons inside Mega Library was quieter at 52 dB on average. The student commons in the library focused on providing learning space whereas the student commons at student centers aimed at
providing spaces for a variety of social activities (hangout, gathering, team work, event, dining etcetera.) Furthermore, given that the student commons in the libraries were reserved for learning, students tended to lower their voices and showed respect to other students using the learning spaces.

A student made a comparison between doing casual learning in the student center's commons and the library's commons,

“When I was in the student center, I could make noise without worrying that I bother other people. I can tap my feet to the music, humming along when I like it. In the library, I don't feel that comfortable. Even in the commons where you are allowed to have conversation. You tend not to talk so loud.”

Social settings were often very crowded and distracting (see figure 18). Tables were arranged next to each other, and even though all of them not were taken, the screen already looked very crowded (see figure 18). Consequently, social settings were not considered optimal for serious learning, as they were often very crowded and distracting. A student described,

“The student center often have a hundred student at one time. People walk in and out. People ate and talk. It is very hard for me to focus on my study. I often find myself people watching and doing nothing.”

However, social settings were often chosen for casual or random learning activities. A student described,

“I can always find a table at the student center whenever I want to do the homework with friends or study by myself in between classes. The student commons is casual and relaxing. I can study at my own pace and do not feel
the pressure of studying like I was in the library”.

3.3.3.1.2. Private-oriented setting

Private-oriented settings were places designed exclusively for serious learning activities or learning activities that require high attention. The goal of these settings was to provide students with necessary privacy to stay focused on learning tasks. Unlike social-oriented settings, private-oriented settings tended not to be noisy and crowded.

There were various types of private learning spaces in the university under investigation in this study; the most well-known of which were study rooms. However, depending on the design, study rooms could be extremely private or semi private.

Figure 19. A Private Study Room

Figure 19 shows a private study room inside a residence hall. The room was located on the far end of the corridor, away from the lounges and places where residents gathered. This gave the room some privacy. The mini window on the door allowed people to see if the room was occupied, however, it did not affect the solitude of the place. The
resident students reported that they found this study room extremely quiet and private. However, they also reported that this study room is most popularly used during exam time, for the majority of studying time, students did their homework in the floor lounge or went to other social facilities on campus.

3.3.3.1.3. Semi-private setting

Students seemed to be attracted to learning spaces that allow them to be both private and sociable. There were a variety of facilities designed with socialization and privacy in mind. For sociability, the facilities were usually equipped with group study booths and for privacy, there were glass study rooms and study carrels.

Group study booths were often outfitted along the walls of the student commons or along the walkway as space dividers. A group study booth occupied about 44” square feet with a table of approximately 24” length, and approximately 36” tall. The group study booths were large enough to sit four people for collaborative or individual study. Soft seating was comfortable and the availability of power outlets allowed students to study for several hours straight.

This semi-private spaces were the most favorable learning spaces for students to engage in casual learning as they offered the privacy for study but kept the social noise levels down. A student said,

“I usually try to find a study booth. But they are usually occupied. The study booth is private enough for me to focus on my learning. It blocks out the movement but still let me emerged in the buzzing sound. Thus, it is less distracting. However, I could still see what is going on around. I can still
Figure 20 shows the study booths in the student commons. Although, students were doing different learning activities, they seemed very relaxed. A student was seen lying on the booth's sofa while another was seen taking a nap. The rest of the students were either busy with their books, notebooks, and laptops or talking with each other. Everybody seemed to mind his or her own business.

In my opinion, large tables on the quiet floors in the libraries encouraged more socializing despite the low noise levels on those floors. The fact that rows and columns of tables were placed next to each other and each table was filled with one or two students made this place a busy place. Even though studying consisted of mostly reading, visual distraction from crowding was inevitable. Through interviews, most students
sitting at large tables in quiet rooms were preparing for tests. They needed the companionship of other students to create an atmosphere of learning. A student commented,

“There are a lot of people studying seriously in the library. Everybody focuses on his or her own work. Being in this environment, it makes me feel shameful not to do like them, focusing on my study.”

Study nooks at some academic halls supported socialization more than privacy. One likely reason may be because the study nooks were often located in social spaces such as the corners of expanded corridors and these spaces received a lot of distractions from people moving, talking, and socializing. However, study nooks provided a good learning space for serious learning, casual learning, or private learning. Unless there was a lot of traffic in the corridors, most of the time, academic corridors were very quiet. Many students in the interviews favored the study nooks at Nook Hall (see figure 18). Not only these nooks gave them the amount of quiet time they needed, they also afforded them the level of visual distractions they preferred.

In figure 20, a student was sitting with comfort in a window nook. She surrounded herself with her study belongings (laptops, notes, books etc.). She did not mind the big trash can nearby. On the wall, there was a sign that said “no napping” which the building administrator hung up to prevent students from taking naps in the nooks.

The students preferred learning spaces that were neither too quiet nor too crowded. Considering that the narrow corridors in the academic halls during the time when classes were in sessions were very quiet and deserted, many students preferred the quiet corridors to the crowded student commons.
Figure 21. *A Study Nook*

Figure 22. *Study carrels vs Tables*
The study carrels seemed more private than the large tables. However as seen in figure 22, students tended to select tables rather than study carrels when both furniture were available in the same room. However, it should be noted that these learning carrels were designed to sit several students at the same time, which may interfere with the original goal of study carrel as to provide semi-enclosed space for students to study. It should also be noted that power-outlet was only available on the side of the tables. These two factors could influence students' preference for table seating.

Study carrels or individual study booths were mostly found in the quiet areas of the library. A few were found in the corner of the basement in the student commons. Study carrels were often outfitted in quiet spaces and in places far away from traffic and socializing activities. For this reason, study carrels had very low noise and visual distractions. However, the large tables at the libraries may have had similar low noise distractions, but probably higher visual distractions as the tables were located in open spaces. Most study carrels were very small at about 10 square feet and were good enough for individual usage. These types of carrels were often found in the Mega Library along the windows behind the bookshelves on the third and fourth floors (see figure 11). However, the modern carrels offered twice as much table space. These modern carrels were found in the basement of the Section Library where students could spread their learning materials or share the study carrel with another friend (see figure 10).

I found that glass-door study rooms were more private than student carrels but less private than solid study rooms. The glass doors blocked crowding noise completely. Students in the glass-door study rooms could be in a complete different world even though they were sitting facing the student commons areas. On other walls of the glass-
door study rooms were big white boards on which they brainstormed, drew diagrams, and took notes. The glass doors also allowed occupants to avoid the stress of being jammed inside four walls and allowed students to obtain quick refreshments while not feeling excluded or confined.

Figure 23. *A Glass-door Study Room*

Figure 23 displays a female student who occupied a glass-door study room in the student center. The room was quite big for individual learning, but once it was occupied, other students would not enter to share the space with her. Through the glass, the student could feel less confined and other students could notice that she had occupied the learning space.

3.3.3.2. Noise

There were various levels of noise in informal learning spaces on the Green Field campus depending on where the learning space was located in the social-private spectrum. Learning spaces at the social end of the spectrum, the social-oriented settings,
had a lot of conversational noise whereas learning spaces toward the private end of the spectrum seemed to receive minimal noise. On average, noise levels were at about 62 dB in the student commons at the student centers, about 58 dB in the student commons at the library at, around 46 dB in the library quiet floors, about 42 dB at the carrels, and the about 40 dB in the study rooms (which were often sound proof).

However, the most interesting part of the finding was not the level of noise, but how students perceived noise affects their ability to focus on learning tasks. Traditionally, noise was believed to be one source of distraction. However, in this study, some students found that they could not study if they were in the noisy student commons. While others preferred to study in the student commons for both serious and casual learning tasks because they either found a way to block unwanted noise with their headphones or found that the buzzing conversational noise helped them focus.

During my observation, I noticed that more than 60% of students were using their headphones when they studied. The type of music they listened to were varied and it seemed that turning on the music that they liked helped them to get into the study mood. In this sense, the headphones not only helped them to block noise but also helped them to relax during their study.

However, some students found buzzing background noise particularly enhanced their ability to concentrate. A student described, “In fact, the buzzing background noise helps me focus better. I get uneasy when it gets too quiet.”

“Uneasy” is a psychological feeling depicting that a person feels uncomfortable doing something. Being uneasy was similar to the feeling of being out of place which often led to them going somewhere else to study. However, because students could
supply the type of noise/music that they liked from the headphones, a quiet place may not have been very quiet as they could listen to rock music, pop music, or any programs that they liked. Further interview with the students revealed that the feeling of “uneasy” did not come from being exposed to the source of noise but rather being able to produce noise. A student compared his learning experience in the student commons and the library.

“In the libraries even dropping a pen or unzipping a backpack could get people to stare. Every sound seems to be amplified in the library. In the student commons, I could talk to my friends, I could eat, I could tap my feet, I could hum along...and nobody cares”.

Students seemed to be attracted to places where they could make noise because the ability to produce noise made them more relaxed and less tense. Places such as the quiet floor in the library where students were obliged to be respectful to the study environment may have been intimidating for some students and in turn heighten their library anxiety. In fact, they preferred informal learning spaces such as the study rooms and student commons. In the study rooms, students could discuss without bothering other people and in the student commons their voices were usually lost in the buzzing noises of these spaces. A student commented,

“In the student commons, you can barely hear a conversation from the adjacent table. Everybody talks. Nobody could really overheard anything. It is like your conversation being buried in the buzzing noise.”

“I often book a study room because there I could discuss with my friends without making people around me feel bothered by our conversation. It is pretty private”, an other
3.3.3.3. Crowding

While noise was the auditory source of distraction, crowding was the visual one. People walked in and out, moved around, talked, ate, laughed, and all these movements drew the students attention away from their learning. The students in this study all believed that the more crowded the place the less private it was. Findings revealed that in the students' mind, the perception of crowding was more related to the size of the place and the number of people in the space, than to the person per square feet ratio.

In my observations, on average, the student commons at the Paleo Student Center had a higher density than the Neo Student Center (80% vs. 60% occupied). However, the interviews revealed that many students preferred the Paleo Student Center to the Neo Student Center because it was “less spacious and cozier with less people”. It seemed that being in a spacious place and seeing a lot of people made the students feel less comfortable than being in a smaller place with higher density.

While over-crowding was not preferred in most circumstances, a certain level of crowding seemed to be desirable by many students. Particularly, the students enjoyed places where they could see the traffic and the crowd without being part of them. Being in the middle of the student commons, being inside the study rooms overlooking the crowded commons, being in the academic halls' corridors, or being in the libraries exposed the students to the crowd. However, being in the middle of the crowd was not the optimal choice unless other seating was not available. A student commented, “I preferred the study booths, however, most of the time they are occupied. So I'm sitting
here nearby, waiting to see if any opening comes up”.

Seeking a private zone within social setting was a common practice among the students. To do so they tended to find seating adjacent to the walls or facing away from the crowd. For example, in the student commons many students expressed that they preferred to sit along the glass window where they could look outside to the scenery instead of looking into the crowd inside. The most favorite furniture was the study booths, which were walled up three sides, blocking students from seeing the crowd yet allowing them to connect to the crowd from the opening wall. In a similar way, the transparent study rooms or the glass-door study rooms attracted many students. The transparent study rooms usually had one or two walls made of glass making the same effect on visual crowding for the students inside them. Additionally the transparent partition kept others from invading the study room space, creating a psychological territorial feeling for students inside the study rooms.

Another way to establish privacy in the middle of the social-oriented setting was to limit conversations with strangers or go to places where friends did not gather. A student explained, “If I really want to focus on finishing my work, I would go to the second floor in the student centers. Not many of my friends study there.”

The students also disliked being in places where they were totally isolated and had minimal contact. For example, the solid study rooms were very private places but they were not the students’ favorite spaces. During the observations, I rarely found the students using the solid study room in the basement of Box Hall. Even the cafeterias in academic halls or the libraries at night time saw no students because the places were so far away from the public eyes as classes were not in sessions. For example, students
mostly used the cafeterias in Nook Hall and in the basement of the Mega Library during the day. At night, when the cafeteria services were closed, there was barely anybody using the empty spaces to study. The story was totally different for the commons in the student centers and the libraries. They were crowded both during the day and at night even when food services were closed. A student reasoned the difference below.

“I sometimes study there in Nook Hall's cafeteria at night. But you see it was a little bit uncomfortable when you see nobody around. It is a research hall so by nighttime everybody has gone home. Many of my friends would go to the student commons. I guess that it is more social over there.”

3.3.3.4. Light and color

Observations and interviews from this study supported daylight preference for studying. Window seats were more occupied than seats in the middle, or in area with less natural light.

Figure 24. Natural Light
In the interviews, the students stated,

“**I love sitting by the windows looking over the campus.**”

“My favorite seat was the one that faced the large window over there. I could see the trees turning orange as the fall set in.”

“I just pass by and I think, oh my god, it is beautiful over here in the sunset'. So I decided to stay here to study instead of going downstairs to the common area.”

Participants thought that windowless seating caused them to “feel down”, “upset”, and “cramped in”. The students due to uncomfortable feeling did not favor places without natural light. A study room in the basement of an academic building, even though well lit by artificial light, was observed with few or no students during most of my observations.

A student said,

“I only come there (the study room in the basement) for printing. Sometimes meeting my classmate there, but not for long. It was too gloomy to feel comfortable. Most of the time, we would go to the student center. It was much airier over there. And we would sit in one of the tables by the windows and have some snack while talking over the class project.”

The students in this study also reported performing better under natural light condition. One student had this to say about the natural light, as she compared Paleo and Neo Student Centers and Mega library.

“They (the student centers) seem not so dark and claustrophobic. But I also like the wall of windows in the student centers too. So that is kind of why I
don't like the library, because it is kind of dark and it is kind of hard to
concentrate on reading.”

The role of color was also an interesting finding in this study. Participants seemed
to favor warm and vivid color over plain ones. A student described her preferences,

“The color of the wall? Well, I would prefer it to be warmer, in the orange
kind of tone for example.”

Another student said,

“It should not be too colorful. That is distracting. But warm color with some
decoration could help making the place warm and welcoming.”

3.3.3.5. Furniture

In my interviews with students, I asked them to describe the ideal informal
learning space and things that they would recommend to campus facilities. Using their
suggestions, I comprised a list of furniture items that the students wanted.

1. A couple of tables and comfortable chairs of different sizes
2. Some dividers
3. A couple of study booths
4. A couple of sofas
5. Some white boards
6. Plenty of outlets
7. Some refreshment sources

For a small study room within the residence halls, libraries or academic buildings,
students wanted ways too many things. A student described a perfect study room that he had in his mind, “Not too big, maybe just a couple tables, maybe some dividers. Maybe divided into different seating zones with tables and chairs and a white board.”

Another student shared the same view. She described her ideal study room like this,

“I think it would be, I know a lot residence hall have study rooms, they have a big white board that you can use and tables and stuff. I feel like that would be good to have in certain academic building. I know that the journalism schools have some, but I don't use them a lot. But I know they are there. But in an academic building to have a room where there is a big table but multiple tables like a mini-student center over there to maybe have kind of relevant textbooks or newspapers or magazines that are relevant to department. The academic department could have a room with a few tables, a white board so you can go over what you study, and things like that. And a few textbooks that you could take a glance.”

Students seemed to seek out semi-private seating too. Booths were among the most favorite furniture.

“Maybe more kind of individual private booths. You kind of need to have a big table space to bring your stuff out. I would just like to see more of that types of stuff”, one student suggested.

“Yeah, if you have a booth, it will shut everyone out.” Another student commented about the usage of booth to eliminate unwanted noise.

Student also preferred more tables than sofas because tables kept their alert
level high enough to study and not to lie down and sleep. Tables that have soft chairs as in figure 25 were more preferred by the students.

Figure 25. *A Table with Soft Chairs*

A student said,

“We usually try to come to the table like this. We all go up to the center for student involvement upstairs, or a table. But we usually try to find a table rather than a booth or ouches or something, because something about it that makes us more prone to do homework.”

Another student shared similar view,

“I suppose it would be better if they have table here. Because just these comfortable chairs and couches, I tend to just lay down here. I have to pick up somewhere that has a table nearby so that it keep me awake and more
focus. Not necessarily things that are not comfortable but things that can assume productivity. Because when you are sitting on a couch you may become too comfortable with the settings.”

Figure 26. The Needs for Table Space

A large enough table or desk in front of the seating is critical. During my observation, I realized that students needed a lot of space to place all of their gears. On average, a student placed a laptop, some notebooks, some books, an iPad, a phone, some pens, a cup of coffee or a bottle of water and some snack on the table they are using. Many students preferred to have some table space on their side or made use of adjacent surfaces to spread the learning materials (see figure 26).

A student commented, “The table is better for doing homework”.

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Another student added, “For us it seems to be better. And you can usually fit more people at the table too. So if we have a big group, we would take a bigger table. Like I am here by myself before I go to a meeting, so I can take a smaller one.”

“And I don’t study well if I am sitting on a couch or a comfy chair, I need to have this in front of me or at a desk”, another student explained.

3.3.3.6. Amenities

3.3.3.6.1. Food

Food was essential for long hours of study. Thus, restaurants, coffee shops and snack or drink machine were needed.

A student commented,

“So when I study for several hours, I need refreshment. I would go get a coffee or something.”

Another student added,

“It would be nice when you study late at night and have something to eat to get more energy”.

“So I could go and grab caffeine if I need to. I can rent out computers”, another student described.

3.2.2.6.2. Power outlets

Of all the amenities provided by the informal learning spaces, power outlets were in the most demand. In the words of one designer, “We had built in more outlets than the original design. But it does not seem to be enough.”
Indeed, distribution of seating in the rooms seemed to be dependent on the distribution of outlet. I was surprised to walk into a big study room in the library to see that all students flocked to one side of the room. “It must be the windows, everyone loves natural light”, I initially thought. Nevertheless, when I returned at night to the same place for more observation, students still gathered toward the side with windows although the night had already set in. It turned out that the power outlets were only available on one side of the room (the window side) and everybody was trying to sit near the outlets.

A student was very upset because with the recent renovation of the library, the tables were moved to the center of the room far away from the outlets. Upon realizing that I am doing research on how students use this learning space, he asked me to recommend the library to revert furniture distribution to the previous layout. This was his message,

“Could you tell them that many of us need the outlets? I used to study down there in the big room where the big tables are. Now I can't, my computer does not hold battery long enough. I need to use the outlets.”

Of course, there are ways around the matter of outlet, but students did not seem happy to use the alternative. Another student suggested,

“Out of all that is necessary for learning, I wish there were more outlets. Because this whole middle area there is no outlet, so if you sit there, I hope that you don't have to charge to computer. Usually if my computer dies, I would go over here and charge it and rent a computer while my computer charges. So there are ways around it but it is a little annoying”

The complaints about outlet shortage continued,
“People kind of always fight to see whether there is an outlet around here. I just think that if they have more outlet abilities, people would be able to study longer. If you don’t bring your charger, you got to go home to get it. I don’t know. Maybe that’s the one thing that I would like to see.”

“That outlet problem is very real. That is also another reason why I don't like studying here. The outlets are concentrated around certain areas. And those are always crowded to find plug-in.”

Figure 27. The Needs for Power Outlets

Figure 27 depicts the problems of power outlets in Mega Library's quiet study room. Power outlets were placed on the shelves quite far away from the desks. The two students on the bottom right of the photo had their computer cord running through the bookshelves in order to reach the outlet. On the left side of the photo, a laptop was placed on top of the bookshelves so that it could be charged. Perhaps, the owner of the laptop
was sitting too far away from the power outlets and the cord was not long enough to reach the power outlet from his or her table. Thus, the student had to stop using the laptop for a while and left it on the shelf to be charged. In my opinion, having to put away the laptop in the middle of using it could affect the student's flow of thought. Thus, it may affect the student's learning quality.

3.3.3.6.2. Napping zones

Many students in this study expressed the needs to have a place to take a nap during their break. A student complained,

“\textquote{I wish that there are places for students like us to take a nap. Students who live in the residence hall can go back to their room for a nap. My house is too far away on campus. I have no other choice but to hang around informal spaces until my next class in the late afternoon.}”

Figure 28. \textit{A Napping Zone}
In deed, it was a common scene to see students lying around in one of the lounge at the Paleo student center (see figure 28). The picture was taken at noon time when students had lunch break. There were seven students occupying the lounge. Four of them seemed to be napping. One was lying reading, one was using laptop, and one was listening to music. Even though I did not interrupt these students for interview as I respected their privacy time, through interviews with other students I could conclude that the students in the photo were not acquaintances. However, they dared to take a nap in front of strangers because it seemed that napping in informal learning spaces have been a popular practice.

The student participants told me that popular places to take a nap on campus were quiet zones inside the student centers. Places that were equipped with sofa and low lighting were more preferred. Apart from the lounge in the Paleo Student Center where students were seen napping in figure 28, the basement of the Neo Student Center was also a common place for napping activities. This basement lounge was larger with more comfortable sofa, less bright light, and was very quiet. Many students were seen lying, napping, resting or reading books.

Some students even took a nap in the sofas or benches along the academic hall's corridors. Obviously, their actions were not approved by the buildings' administrators. For example, to avoid students taking nap in the nooks along the corridors, the manager of Nook Hall decided to hang many “no napping” signs. She explained,

“It is kind of disconcerting to have the interactive energy in the atrium and see this around. To stand here and explain the research that you do to strangers, it is a little concerning if you see someone just having a nap.”
Since the “no napping” sign was placed on the wall, students were no longer seen taking a nap in the facility. Nevertheless, their demand for napping places remained and echoed through various interviews. All they looked for were places that were far away from activities and were comfortable to rest a little bit before the start of another class.

3.3.3.7. Location

So far, factors such as the setting, the noise, the crowding, the lighting, the furniture, and the amenities could be used to explain the choices of place in some situations, especially when students had spared a certain time during the day to go there. However, when students were under time constraints, such as when they were waiting, there were other factors that played more prominent roles: the matter of location or the place in which the informal learning space was located. I identified two sub-themes within the matter of location: proximity and visibility.

3.3.3.7.1. Proximity

Proximity or the distance between the space and the students at a certain time proved to be an interesting concept. Proximity was relative, which meant that the perception of proximity was dependent on the way students viewed it. There were three types of proximity that students considered when selecting an informal learning space: proximity to the current location, proximity to the destination, and proximity to the residential area.

Proximity to the current location

Interviews with students revealed that they chose informal places that were close in proximity to their current location. For instance, after finishing a class or a meeting,
many students hung out at lounges in the same building or nearby buildings to complete homework before heading home or to a different class. A student said,

“I usually go to the Mega Library on Monday when I have a class there...however, this afternoon I did some homework at the residence lounge... It was next to the dining hall so I came straight there after lunch.”

**Proximity to the destination**

Many students used the time between classes to do homework and class projects. These students often selected the location near their destinations to avoid being late. Many times the proximity to the destinations was more important to the students than the comfort of the space. Many students hung out in the corridor in front of their classroom for several hours before class instead of finding a comfortable place farther away. A student who was reading a book for class in the hall way told me,

“I had lunch with friends at a restaurant downtown. Then I came here afterward...I think it's just convenient. Usually I study at the library or student center for other classes. Today it was just more convenient to go where my class was, rather than having to walk that far to this class.”

**Proximity to residence area**

Although, there are several libraries on campus students who resided in residence halls and Greek house soften went to the Section Library. The administrator of the library explained,

“We are a good place to study because we are the closest library on this side of the campus. For those who live in the dorm here or you know back over
there, they have to walk pass here anyway to get to anything else. So we
kind of a midway in campus as far as the library and places to study, I
think.”

3.3.3.7.2. Visibility

The role of visibility in the selection of informal learning spaces can be
summarized by one student's comment: “It is nice to walk through the building and notice
that there are little corners that you can sit down and study.”

The visibility of an informal learning space can be enhanced by two elements:
centrality and circulation built-in.

**Centrality**

The ability to notice a place suitable for study is critical because without
recognizing its existence, people would probably not go there. To be visible, it is essential
that the learning space is located in high traffic areas where students tend to gather. It
would not be a good idea to place a student center in an unfrequented corner of the
university. It would be better to place this gathering facility in the center of the university
amidst dormitories and academic buildings. The idea is for students to easily notice the
existence of the learning spaces as they move from one building to another on a daily
basis and to conveniently use these spaces.

It seemed that the more centrally located a building was, the more likely it was
crowded. This principle was true for the Neo Student Center off the junction of residence
halls and academic buildings. Surrounded by floor to ceiling windows, people walking on
the street could see students studying or collaborating inside the building. Added to that,
the main floor also hosted a food court, which made the place a traffic hub for many students. Oftentimes students came to eat and stayed there to study. The basement of the student center was less visible to the public, so it was less crowded. Nevertheless, once the students discovered a place suitable for study, they tended to come back. One student expressed, “I usually go to the library, however, I just discovered this place this semester. It is quiet and cozy. I come here more often since”.

**Circulation built-in**

Informal learning spaces that are inserted into the circulation of the building had more usage than those that are housed inside a room. For example, the expansion of the bridge connecting Nook Hall and an adjacent building provided enough space to construct a small study lounge. One student admitted, “I just pass by and realize that the sunset is so beautiful. So I stay and study here.”

Figure 29. *Benches Along the Walkway*
The lounge soon became the gathering place for faculty and students at lunch time. It also served as a meeting place for the departments, a study place for some student in between class time, and a collaborative station for teaching assistants to grade and discuss research projects. Even students from other departments went there and enjoyed their spare time in one of the chairs.

For example, in Nook Hall, informal learning spaces were integrated into the walkway. Students could easily find empty benches to sit and study as they walked along the corridors (see figure 29).

Indeed, circulation areas have been recognized as critical in constructing informal learning spaces. One campus facility planner said,

“In terms of academic building, what we are trying to accommodate is not necessarily significant informal learning area but bit and pieces. If students are leaving the classroom, we are trying to find a way to incorporate an area where students can step into the side of the hallway and be able to talk to the professors or another college students. But in the classroom building and academic building, we are not working with large amounts of space, we are working in pockets of space, we are working them into spaces where it is near resources.”

Another designer remarked on another circulation built-in lounge.

“We have a very large lounge, you can probably occupied with 50 students and even more with standing room. It is divided by main by walkway into the lounge is a computing space. It is a very active and social computing space as well because it has so much traffic that come through the area and it
is open to campus to be used by a lot of people. It has been a successful space for us.”

Informal learning spaces that were not integrated into the circulation usually saw nobody or very few people. The first time I attempted to visit the student resource room at Box Hall following the suggestions of one interview participant, I could not find the place after several times strolling along several corridors. Finally, I knocked on an open door and asked a student about the student resource room who was kind enough to walk me to the place. The room was hidden among surrounding classrooms in the basement of the building. The door was closed so it was hard to differentiate it from the adjacent ordinary classrooms. My conclusion after visiting the student resource room in Box Hall was similar to one student's comment, “Many students may not know that the student resource room is there”.

3.3.4. Managerial factors

Apart from learning and environmental factors, the building management factor also played a significant role in students’ choices of informal learning spaces. Every building had its own facility usage regulations, which were maintained and executed by the administrators of the place. The students were required to follow the regulations and this affected their choices of place. From the data, it seemed that students’ choices of place were more related to accessibility and flexibility in the learning space.

3.3.4.1 Accessibility

Accessibility was described as public access availability. A public place is the one that could be used by students, instructors, staffs, visitors, or anybody outside the
universities. On campus, a place known as a “student's place” attracted more students than a place reserved for certain groups of students or for departmental use. For example, the student commons were well known as space for students, visitors, and staff. Students tended to gravitate towards these places because they knew that the places were designed for them and they could do most student-related activities without restrictions. Many students explained that they would rather come to the student commons to study instead of going to the downtown coffee shops because they felt entitled to use college spaces.

Similarly, lounges and study rooms inside residence halls were reserved for student residents in the buildings. Residents were free to use any study rooms or floor lounges to study. Non-residents were only able to use the main floor lounges. Therefore, the main lounges were common meeting places between residents and non-residents.

Figure 30. A Closed Door Indicates Inaccessibility
A huge conference room in Nook Hall was one example of an informal learning space that did not receive student crowding due to unavailability. According to the manager of the building, the availability of the huge conference room for students' informal learning had not yet been announced. The door of the room was also closed, giving the students the feeling of “being uninvited” (see figure 30). Thus, there were no students in the room even though the room was well lit with natural light and had plenty of tables for group work. However, the study nooks in the same building were available for public use. Thus, students from different departments were observed doing homework or reading in the nooks along the corridors there.

3.3.4.2. Control

Having a measure of control when they were in an informal learning place was also an important factor in the selection of places to go. Control, in this sense is defined as the ability to make changes to the surrounding environment to fit individual needs. On campus, places where students had the most control were inside student facilities including the student centers and the residence halls. Having given some control of the student commons, students usually arranged the furniture to fit their needs. Often, students would pull several tables together to make a group study space. They could do so in the library too but they tended not to do so, often for fear of causing distractions to others who were studying nearby. One student said,

“I usually don't move tables in the library. I may move a chair to make space for my legs. But moving the table would make a lot of noises”

Students also preferred to use the university's facilities to study rather than private
companies' facilities to study. A student said,

“I don't feel like studying in coffee shops downtown because I am taking
their space and not buying their products. But I pay to go to this university,
so I could stay in the student centers as long as I could”

However, students would not use unused classrooms for self-study. It seemed that
there was an unwritten rule about the usage of academic buildings: academic buildings
were under the control of the academic departments, specifically the administrators and
the teachers. The students had this to say when I asked them why not using empty
classroom to do self-study,

“I don't feel comfortable using classroom spaces for my own study”, said
one student.

Another student added, “It is weird to have 30 tables and chairs for
yourself.”

“Classrooms are for teacher. When I finish my class, I just want to get out,
not stay over and do my homework,” commented another student.

3.3.5. Interacting with informal learning spaces

So far, I have identified how students went about choosing the place to do self-
study beyond the class time. Because the students wanted to be academically competent
and socially connected, they usually selected a place to study where they could achieve
both. Depending on the learning task, the places chosen were more private than others but
students wanted some elements of sociality in these places. And they were not very
interested in places that were extremely social or extremely private for study.
Factors that they considered as they made the decision to choose the learning places included the nature of learning tasks, the settings which provided different level of noise and crowding, natural light, furniture, and amenities. They also considered whether the informal learning places were nearby and visible to the public. Being able to access and customize the learning place were also important to their choices of going there.

However, it was not always the case that students could find a place that satisfied all their requirements for learning and socializing needs. Often, they leveraged different factors and decided for themselves which factors would be the most critical, and sacrificed the rest of their needs. This led them into the situation of taking actions toward a place or toward themselves in order to fit their learning and social needs into the chosen informal learning space. The first action to fit themselves into the informal learning place was to customize and if even customizing did not satisfy their needs, they adapted and possibly change learning place.

3.3.5.1. Customizing

Customizing could only happen when students had a measure of control over the learning spaces. Without the right to make changes to the environment, students could not take the necessary actions to change the surrounding environment to fit with their needs. They were left with the option of adapting or leaving the place altogether.

The most popular way students customized public informal learning places was to rearrange the furniture. They improved the informal spaces by adjusting the furniture to maximize table space and privacy.

Table space was an important element of the study space. Students needed table
space to lay down their learning materials. In my observation, I found that current college
students needed large table space to lay their learning gadgets while the tables in many
informal learning spaces were quite small. On average, in my observation, an individual
student may display about seven types of items: book(s), notebook(s), laptop, tablet, cell
phone, pen(s), snack and drink etc. Many tables in the informal learning spaces were too
small to place all these items. Thus, grouping tables were obviously needed to enhance
the selected study area and to make it more suitable for their practical needs.

As I noted earlier, privacy was an essential element for learning in the student
commmons. Even though semi-private seating such as study booths were highly sought
after in the student commons, many students had to find ways to create their own privacy
zones within the crowd. In the observation, at the student commons, many students used
furniture and books to mark territory of the study alcove, which helped them to feel more
private during learning.

However, customizing was not equal in all informal learning places. The students
seemed to be more comfortable customizing furniture in the students' center, but they
hesitated to do so in the commons of the library for fear of distracting other students. A
student commented,

“When I move something in the library, I have to be very careful. Any
movement makes noise, even in the commons where they allow you to talk.
We try to show respect to other people space by talking in low voice, trying
not to make noise from moving furniture.”

Customizing seemed to be the most flexible in the residence halls. The designer of
the residence halls described an occasion where students initiated the removal of furniture
pieces to space for collaborative activities,

“One of the pictures that I show you, where all of the four tables that were sitting together, they have plaster on the bottom of those. Those actually had dividers when we initially put them in there. That what we thought the students wanted, these tables that have the dividers. They were just little partition keepers. And we found out very quickly that they were taking them off and putting them in the corners in the room, within a very short period of time of occupying the building.”

In some places, the furniture was designed so that it would be easier to customize. For example, small tables could be arranged into bigger tables and movable whiteboards could be relocated near the student group discussion. In addition, rectangular tables were easier to customize than round or irregular shape tables, and etcetera.

Figure 31. Movable White Board
Figure 31 shows an example of one among many moveable whiteboards that are positioned along the corridors around the atrium in Nook Hall. Many students loved the movable whiteboards because they could easily transport them to any locations. They could place them next to the study booths for discussion or move them behind the study booths to save space for circulation. The boards also gave students better control of furniture used for learning activities and made it easier for them to customize the learning spaces to their needs.

### 3.3.5.2. Adapting

Even though customizing could improve the fit of the environment to the students' need, it could only partially fix the situation. There were instances where students simply could not customize the learning space. In most of these cases, students learned to adapt themselves to the environment so that they could perform the learning task.

My own experience studying in informal learning places informed my observation about the ability to adapt to environmental factors in these spaces. Initially, I was not very comfortable with the noise in the student commons, which interfered with my ability to focus on reading and writing. In my first few study sessions in the student commons, I brought along simple homework such as editing photos and typing information. Soon, I began to conduct more complicated tasks without paying much attention to the surrounding noise. Soon, I realized that I enjoyed the buzzing noise so much that I missed it after I stopped regularly going to the student commons. Similarly, students who I observed customized and adapted to learning situations.

Because there was limited private space for students to use outside the
classrooms, many students had no choice but to make use of the social busy common. Eventually, they became used to learning in social-oriented setting.

“At first, I felt it is so hard to find a place to spend my time in between classes. The library is very tense. The student center is very crowded. I chose the student center. I am used to that now. The noise, the people don't bother me at all. And you can always find quieter space, if you go upstairs or downstairs areas”, a student commented.

“I like to be in the lounge in the basement better. It is quiet there. Here, it is very noisy, almost chaotic. But I need a table to write on. So come here (the commons) instead.... Yeah, it can be distracting at first, but I put my headphone on, and I'm totally fine”, another student added.

3.3.5.3. Alternating locations

Some students described the habit of alternating learning places in order to “get a better mood to study”. “It's like when you are at a place for too long, you feel fed up with it”, a student commented. She usually went to the Mega Library to study because “I worked in the Section Library so I just want to go to a different place to study by myself instead of staying over here.”

An explanation for the change of learning environment provided by the students was their mood: they liked to use learning places to set in the mood for study.

“It depends on the day. Sometimes I come to the library, like today.

Sometimes, I would be in the student commons, or in one of the coffee shops downtown.
Chapter conclusion

The findings show that the students in this study considered various factors as they chose informal learning spaces. Being driven by their needs to balance academic life and social life, the students seemed to attract to informal learning spaces where they could be socializing while studying. Their more preferred informal learning spaces were private zones inside social facilities. The findings also show that the students in this study took into consideration the nature of the learning tasks and the ways physical environmental factors at different facilities support or hinder their abilities to complete the learning tasks. Many students also considered managerial factors, which enable certain levels of control and accessibility, as they select informal learning spaces. The students' goal was to find the place that match their needs, learning tasks, their ability to handle environmental factors, while complying with individual building's usage regulations.

Even though the students in this study were found to actively improve the fit between themselves and informal settings, they were not much flexibility available for them to customize the learning spaces as they wished. Most of the time, they had to adapt themselves to the available informal learning spaces.

Chapter summary

This chapter describes the main findings of the study. The chapter begins with a description about participants and research sites. This aims at providing a context for the data analysis. The focus of the chapter is on the model of informal place choice and interaction. The model is an expansion of Lewin (1950)'s framework in which needs,
learning task, environmental factors, and managerial factors all contribute to the choice of informal learning spaces. The model also indicates the ways college students interact with informal learning spaces and the way they customize and adapt to informal learning spaces.

The chapter is organized into five sections:

A description of participants: This section provides a description of the people participated in the study, including students, professors, campus facility planners, designers, and administrators

A description of research sites: This section provides details about the campus, ten buildings and their unique informal learning spaces.

A model of informal learning space choice and interaction: This section describes factors that the college students participated in this study consider when selecting informal learning places to study outside the classroom. Factors were grouped into four types: needs, learning tasks, environmental factors, and managerial factors. The ways the students in this study react to informal learning spaces are also described.
CHAPTER FOUR: DISCUSSION

Chapter introduction

The college students in this study based on various factors to select informal learning spaces to study including needs, nature of learning task, environmental factors, and managerial factors. Below I discuss how the model of informal learning space choice and interaction relates to Lewin's (1951) field theory and the literature. I also discuss how the findings in this study relate to the issues of perceived environmental distractions, person-environment fit, context-dependent memory, and the perception of third place.

4.1. An expansion of Lewin's field theory

Lewin's (1951) field theory proposes that \( B = f(P,E) \) or behavior \((B)\) is the function \((f)\) of the interaction between person and environment \((P,E)\). By “field”, he referred to “the totality of coexisting facts which are conceived of as mutually interdependent” (Lewin, 1951, p. 240). In other words, person and environment are co-existent and mutually affected each other. A person needs to be understood within his socio-political environment, and vice versa, the environment that he is interacting with needs to be seen under his influences. Therefore, behavior or the result of the interaction between person and the environment could be varied depending on individual background and the way the person perceives the environment.
This study uses Lewin's (1951) field theory to create a model to explain college students' choice of informal learning space. The model illustrates that person is directly influenced by their needs and the learning tasks, and the perception of the environment is directly influenced by the perception of physical environmental factors and managerial factors. These four factors influence students' informal learning space choice and govern their behaviors at informal learning spaces.

The unique of this study is that it adapts Lewin's (1951) framework to explain informal learning space choice. This adaptation of Lewin's (1951) is much needed since there are not many models available to explain the relationship between students and learning environment, especially between current college students, also known as the Net Gen college students, and the modern learning environment.

Prior research has also expanded Lewin's (1951)'s framework in educational context. For example, an ecological perspective to understand the relationship between students and school environment was developed by Barker and Gump (1964) and Gump (1978, 1980) based on Lewin's (1951) field theory and Barker (1968)'s ecological psychology. Carrying Lewin's (1951) core message that “the totality of co-existing facts” should be in consideration when evaluating human-person interaction, Barker and Gump (1964) emphasized that the whole school including teachers, students, administrators, managers, parents, society and et cetera should be included in the understanding of student behaviors.

The model of informal learning space choice developed in this study also reflects the “totality” messages by Lewin (1951), Baker and Gump (1964), and Gump (1978, 1980). The model shows that a student's choice of informal learning space is based on
not only his own needs, his own learning tasks, or the way he perceives the physical environmental factors but also existing managerial factors such as regulations on the control, usage, and access to places. In other words, the ways informal learning spaces are governed and managed by the universities are among the factors that lead to the selection of certain informal learning spaces. Specifically, in this study, informal learning spaces that were designated for student usage such as student centers received most students. In formal learning spaces that were designated to a certain group of students, such as lounges in residence halls, received less students. And places that were recently repurposed from conference rooms or classrooms into informal learning spaces may not receive a lot of people due to the lack of announcement for availability.

In general, the model of informal learning space choice and interaction developed in this study is a contribution to Lewin's (1951) field theory. The model shows the importance of individual factors such as needs, learning task factors, environmental factors, and especially managerial factors in the context of student's selection of informal learning space. The model is especially applicable to modern learning context in which Internet-driven college students with the help of technology and student-centered curriculum search for places to study outside the classroom that fit their learning styles the most.

4.2. College students' perception of environmental distractions

Distraction has always been a concern in education. In the past, when knowledge about attention and the way people process information was not yet developed, distractors were defined as stimuli that hindered performance (Dulsky, 1932). However,
today distraction is defined as times when an event initially processed inattentively forces attention to orient to it (Baddeley, Hitch, & Bower, 1974).

There are two types of distractions popularly discussed in the literature--visual distraction and audio distraction. Both types of distraction were reported in this study as essential factors for Net Gen college students' decisions to choose informal learning places.

Net Gen college students in this study perceived noise and crowding as more than just distractions. For example, many participants reported buzzing background noise as more preferable than a quiet space. In fact, many students found that background noise helped them to stay focused, while the quiet spaces in the libraries made them anxious and easily distracted.

There is a lot of research about the impact of background noise on performance. Background noise was found to produce no significant impact on productivity, emotion, and concentration on simple computer task (de Korte, Kuijt-Evers, & Vink, 2007). For complex cognitive tasks, such as reading comprehension, introverts tended to perform worse while being exposed to music and background television than extroverts (Furnham & Strbac, 2002).

However, it seems that Net Gen students in this study exhibited behaviors to background noise different from what is commonly seen in the literature. Net Gen students were found to perform a wide range of learning tasks from easy to difficult under buzzing background noise or music background noise from their headphones. While there is no information in this study to prove Net Gen students are more extraverts than introverts, if Furnham & Strbac (2002)'s study is true, the Net Gen students may be more
extroverted. However, in general, such conclusion seems overly stated.

Perhaps there are other factors influencing the ways the Net Gen process background noise/music in this study. One of these could be the emotional aspects of background noise/music on performance. The Net Gen students in this study claimed that music background and buzzing social background noise “lead them to be in the mood to study.” A study conducted among primary school students revealed that calming music led to better performance on both arithmetic and memory tasks when compared with a no-music condition; however, arousing, aggressive, and unpleasant music disrupted performance on the memory task (Hallam, Price, & Katsarou, 2002). With these findings, the authors suggested that the effects of music on task performance were mediated by arousal and mood and did not affect cognition directly. Another study conducted among undergraduate students reported similar mediation effects of mood and arousal on the impact of music on the performance of an IQ subtest (Schellenberg, Nakata, Hunter, & Tamoto, 2007). Another study among the elderly also reported that classical music significantly increased working memory performance compared with the no-music condition, while having no effect in a white noise condition (Mammarella, Fairfield, & Cornoldi, 2007).

Given that mood and arousal seem to mediate any effects of background music on performance across ages, my finding about Net Gen college students' improved learning mood while listening to music is not new knowledge. However, my findings about Net Gen college students' preference to work under buzzing social background noise contribute to the literature on the Net Gen. Indeed, my study reported that buzzing background noise, social conversation noise, and white noise were considered by many
Net Gen college students to have calming effects, helping them to focus better on learning tasks.

Another explanation for Net Gen college students' improved attention while listening to musical or buzzing social background noise could be understood from the divided attention theory. Spelke, Hirst, and Neisser (1976) described a case when after, some weeks of practice, two subjects were able to read short stories at normal speed while writing lists of words at dictation. The authors concluded that there were no fixed limits to attentional capacity. The Net Gen are trained to multi-task from a young age and they are good at doing so (Carrier et al., 2009; Tapscott, 2008). Being exposed to the Internet and interactive digital games for many years, they developed hypertext minds with which they leap cognitive structures (Oblinger & Oblinger, 2005), enabling them to switch their attention and multi-task comfortably (Tapscott, 2008). Repeated engagement in tasks that require frequent attention shifts could lead to a preference for frequent task-switching over sustained attention during cognitive tasks (Levine, Waite, & Bowman, 2007), which may lead them to prefer working under some level of distraction, such as buzzing or musical background noise. Additionally, habitual multi-tasking may also condition their brains into an overexcited state (Wallis, 2006), thus they need to find sources of distraction from music or background buzzing noise to keep their brain in focus.

While many Net Gen college students in my study also reported the need for some level of audio distraction, they seemed to be less excited about visual distraction. The students reported their preference for semi-private space in which they could be partially exposed to the crowd, instead of sitting in the middle of the crowd or in an isolated
corner. Pool, Van der Voort, Beentjes, and Koolstra (2000) conducted an experiment on
the impacts of background soap operas on homework performance of eighth-grade
students, who by the year 2014 would be attending one of the higher education colleges.
The study reported that visual distractions were more detrimental to performance than
audio distractions, as students in television conditions performed worse and used more
time to complete the homework assignments than those who were just exposed to the
soundtracks of television programs. Findings from my study resonate Pool et al. (2000)'s
conclusion by showing that young adults/college students also found visual distractions
to be more negative to their performance than audio distraction. Many Net Gen college
students in my study tried to minimize visual distraction in social learning spaces by
favoring study booths and study rooms, or sitting facing the walls. By doing so, they were
able to avoid seeing people talking, eating, and moving, but still feel “present” or
connected with their surroundings through the background noise.

4.3. The Net Gen's perception of privacy

Findings from this study showed that Net Gen college students preferred informal
learning spaces that provided some elements of privacy and sociability rather than places
that were extremely private or highly social. Specifically, students’ most popularly
occupied-furniture for learning was the study booths in the student commons and study
rooms. Many students even suggested that the university should provide more semi-
private learning spaces.

Sundstrom, Burt, and Kamp (1980) conducted three studies that showed that
architectural privacy correlated with psychological privacy. The authors concluded that:
1) partitioned or enclosed workspaces received higher ratings on privacy and lower rating
on noise; 2) a large number of people in the room was associated with lower ratings of
privacy and higher rating of noise; 3) distractions are related to number of neighbors,
supervisor visibility, sides of enclosed workspace, and distance; 4) satisfaction and
performance are related to a workspace that is private and not crowded. For the most part,
Net Gen's perception of architectural and psychological privacy were similar to what was
described by Sundstrom et al. (1980), except for the fact that Net Gen college students
did not give the highest preference to enclosed or uncrowded workspaces. It seemed that
the relationship between satisfaction and architectural privacy of adult workers (the baby-
boomer generation) in Sundstrom et al. (1980)'s study were linear, whereas the Net Gen
college students identified in my study had a relationship was depicted in a curve linear
path.

Net Gen college students preferred to study in crowded places with some noise
rather than studying in places with neither noise nor crowds. This suggests that people
perceive psychological and architectural privacy differently (and the baby-boomer's
perceptions were different from the Net Gen's perception) and that research about the
impacts of environmental factors conducted in the past years by the baby-boomers
population may not be applicable to the Net Gen's population. More research is needed
about the ways the Net Gen perceives the physical environment and its roles in working
and studying.

While there needs to be more research to establish the particular relationship
between psychological and architectural privacy among the Net Gen population, this
study shows that Net Gen college students seem to adopt a definition of privacy close to
the one provided by Westin (1967). Westin (1967) defined privacy as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others" and described four states of privacy: solitude, intimacy, anonymity, and reserve.

Among these four states of privacy, it seems that Net Gen college students in my study were seeking anonymity, reserve, and intimacy more than solitude as they studied in informal learning spaces. They avoided places that their friends and acquaintances frequented (anonymity); they communicated when sharing the same sofa in the student commons (reserve); and they booked study rooms and occupied tables in corners instead of the middle of the room to seek seclusion from the crowd for group study (intimacy). They seemed to care about solitude in a way that is different from the solitude defined by Westin (1967). In the words of Westin (1967), solitude is freedom from observation of others but in the view of Net Gen college students, solitude seemed to be freedom from having to communicate with others. Students would rather sit alone in the middle of the crowd or share couches with strangers without bothering them for social interaction. They were just seeking to “be there” in the crowd of the studying community but preferred not to socialize (Crook & Mitchell, 2012). In other words, solitude carried the meaning of “alone together”, a term by Turkle (2012) that described the tendency of the Net Gen to avoid communication and social interaction.

Even though the Net Gen students preferred to be alone together, they considered social connection as one important factor of college life apart from academic achievement. Indeed, many Net Gen college students believe that a desirable college student to balances academics and social life. However, as described above, they did
seem to socialize in a unique way -- socialize by being “there” in the learning community without bothering sharing conversation. Crook and Mitchell (2012) identified four types of social connections students make in the course of their campus experience: 1) focused collaboration (planned and outcome-oriented); 2) intermittent exchange (independent study that permits occasional and improvised to-and-fro questioning and commentary); 3) serendipitous encounter (chance meetings with peers); and 4) ambient sociality (“being there” in the studying community).

In my study, Net Gen college students expressed all four types of social connections mentioned by Crook and Mitchell: they did group work, occasionally exchanged information, had chance meetings, and liked “being there” in social places. A unique part of my findings, and a contribution to Crook & Mitchell (2012)'s four types of social connections among current college students, is that during the social connection, Net Gen college students preferred more sociality from ambient noise rather than visual crowding. “Being there” in social places thus acquires new meaning as being present among the buzzing noise while visually excluded from the crowd.

4.4. Net Gen-informal learning space fit

The person-environment fit framework has been popularly used to explain the match between individual students and the learning environment that affects learning performance. The question that arose from this study was how Net Gen college students feel about the available informal learning spaces in higher education campus. In regards to the fit as it pertains to Net Gen college students and informal learning spaces from the point of view of Edwards (1996), my research indicated that Net Gen college students
were struggling to find the fit between environmental demands and individual abilities, as well as between environmental supplies and individual values.

Distractions in the informal learning spaces are abundant. There may be distractions from noise, movement, crowding, activities, or acquaintances. These distractions demand Net Gen college students to find ways to handle them. Even though some distractions may be perceived as beneficial to the Net Gen's divided attention, addressing them is challenging. Even though Net Gen college students are experts in dividing attention through their years of interaction with the Internet and interactive digital games, it was hard to maneuver the distractions and spare the appropriate amount of attention to achieve good performance in learning tasks. For this reason, it seemed that Net Gen college students in my study were actively seeking to improve the fit between their abilities to handle distractions and the demands from the informal learning environment.

Additionally, even though the Net Gen in my study preferred some types of semi-private learning spaces to the ultimate quiet or highly social spaces, the availability of semi-private learning spaces were not abundant. Thus, they attempted to find the balance between available environmental supplies and their own needs for environmental stimuli. When study booths were fully occupied, the students would accept sitting in the open areas of the student commons, and although they still engaged in their learning tasks, they were not very satisfied. When the learning places became too quiet, many students used their headphones to provide ambient noise to their taste. Headphones could block unwanted noise too. The attempt to balance environmental demands and student abilities, as well as environmental supplies and their own value/need, occurred throughout their studies in
the informal learning spaces, making the learning experience a continuous management of the balance between themselves and the surrounding environment.

The discovery of the way in which Net Gen college students coped with the environmental demands and environmental supply shortage in informal learning spaces is one of the major contributions of this study to the literature. Most person-environment fit frameworks have focused on the match between individuals and the physical environment, and either showed a fit or a misfit between the two. This study contributed to the person-environment fit framework applied to Net Gen college students by showing that Net Gen college students actively took actions in improving the fit between themselves and the physical environment of informal learning spaces. Net Gen college students' attempt to make use of the available learning spaces has made informal learning spaces better places to study beyond class time. They did it in four ways:

1. Selecting the learning tasks appropriate to the learning space and vice versa: Serious learning tasks in private places, casual learning tasks in social spaces, and random learning tasks in transitional spaces. Specifically, Net Gen college students tended to use libraries and study rooms for more serious learning, lounges and commons for casual learning, and the academic hall corridors for random learning. Research has shown that multi-tasking was more likely to happen with easy tasks (surfing the web, e-mailing, IMing, using the telephone, texting, etc.) and less likely to happen when it involved more difficult tasks (reading comprehension) (Carrier et al., 2009). Even though it was not shown in my study whether environmental stimuli tapped into the same channel of the brain as reading comprehension among Net Gen college students, it was shown in other research that the brain could flexibly allocate attention to visual and
auditory working tasks (Morey, Cowan, Morey, & Rouder, 2011). Specifically, the authors reported that in critical conditions, an increase in reward for one task corresponded to a decrease in reward for the concurrent task, but memory load remained constant; thus, they concluded that the shared attentional resource of the brain could be flexibly divided with a trade-off between the tasks. However, even though attention might be traded off between visual and auditory tasks, the unified attentional bottleneck in the human brain may put a limit on what we can perceive and what we can act on in multitask settings (Tombu et al.), 2011). Thus, the ability to balance attentional resources to environmental stimuli and learning subjects become critical to maintaining the normal speed of learning in informal learning spaces. Especially when the Net Gen somehow needed environmental stimuli or distractions to supply for their overexcited brain (Wallis, 2006), the challenge was to know how to allow enough environmental stimuli to satisfy the brain without exhausting its limited attentional resources, which should be used for learning activities.

2. Customizing the physical environment for better fit: They would put on their headphones to adjust the amount of background noise distractions, sit with their backs to the crowd to avoid seeing people moving; or enclose themselves with chairs and books to create a private zone to study. Indeed, customizing has been reported as Net Gen's favorite activity (Tapscott, 2008). Considering that they want their learning experiences to be customized to their taste (Bajt, 2011), expect employers to provide them with flexible schedule and work duty (Martin, 2005), and demand personalized services and environments through having a set of options online (Ras & Rech, 2009), it is understandable that Net Gen college students in my study demanded the physical learning
spaces to be customizable to as well. For campus facility planners, providing flexible spaces for various usage was needed. In the words of Temple (2008), flexible spaces “should be seen as part of the support to learning through developing the wider learning landscape” (p. 238).

3. Adapting themselves to available informal learning spaces: They gradually learned to study in the background noise and developed the ability to study anywhere, even in the dark corridors of academic buildings. The Net Gen are well-known for their ability to adapt to new technology (Roberts, 2005). My study provided new knowledge about Net Gen college students by showing that they had the ability to adapt to different environmental conditions of informal learning spaces. Environmental competence was coined by Steele (1980) as “people's ability to deal with their immediate surroundings in an effective and stimulating manner (p.225)”. With this definition, it seemed that Net Gen college students might have good environmental competence. However, more research is needed to further verify such competence.

4. Alternating informal learning spaces: Perhaps the Net Gen's interest in alternating learning spaces for fresh air was related to their needs for attentional shifts. As described earlier, the Net Gen's brain was trained by digital media to be overexcited and needs attentional shifts to maintain the excitement (Wallis, 2006). Alternating informal learning spaces may happen more often with the Net Gen students, as they potentially become bored easily by studying in one place, just as they are easily bored listening to lectures.
4.5. Memory capability in the informal learning spaces

Context-dependent memory refers to the storage of contextual information along with memory targets, leading to better recall of memories when encoding and retrieval contexts are similar (Smith, 1994). A research about environmental context-dependent memory was conducted by Godden and Baddeley (1975). The researchers realized that divers who learned unrelated two- and three-syllable words underwater recalled them better when they were underwater and words learned on land were better recalled on land (Godden & Baddeley, 1975).

A recent review on environmental context-dependent memory showed that across 75 studies from 1935 to 1997, environmental context effects were reliable (Smith & Vela, 2001). If information could be recalled better in a context that is similar to the one in which the information was encoded, it is advisable for students to study in places similar to the ones where they take their tests. However, this advice directly contradicts the choices of learning places that many current college students adopt.

Net Gen college students like to study in social places with some elements of privacy, but tests are usually conducted inside quiet classrooms. This poses a question of whether students who are used to learning in informal setting are able to recall the knowledge during their exams in formal setting. Further research is needed.

While the needs for more informal learning space in increasing, the lack of information about student learning performance in informal context has made the decision whether to provide more social places or more quiet learning spaces on higher education campuses is a difficult one. Considering all the pros and cons of learning in
informal settings, and considering that self-study in informal learning spaces on campus is an undeniable trend in today's higher education environment, this study has several suggestions. One suggestion is to provide various informal learning settings to the students so that they could select the learning spaces most appropriate for them. Another suggestion is to provide more private spaces within social settings so that students could have more privacy while studying in social places.

4.6. Modern American third places

In the book “The Great Good Place”, Ray Oldenburg (1997) made these notes about the middle-class American's social life:

“Americans do not make daily visits to sidewalk cafes or banquet halls. We do not have that third realm of satisfaction an social cohesion beyond the portals of home and work that for others is an essential element of the good life” (p.9).

He continued,

“American planners and developers have shown a great disdain for those earlier arrangements in which there was life beyond home and work. They have condemned the neighborhood tavern and disallowed a suburban version. They have failed to provide modern counterparts of once-familiar gathering places...Mean time, the planners and developers continue to add to the rows of regimented loneliness in neighborhoods so sterile as to cry out for something as modest as a central mail drop or a little coffee counter at which those in the area might discover one another.” (p.18)
Oldenburg (1997) recognized the deficiency of public gathering places in American neighborhoods. However, it seemed that public gathering places were only problematic in daily life. In the American higher education campus setting, gathering places actually received good attention. Early in the history of campus construction, American campus builders opted for an extroverted layout of campus buildings rather than copying exactly the introverted design from Oxford and Cambridge (Turner, 1984). President Thomas Jefferson, who designed the campus of University of Virginia in 1819, set an example of academic village style in American colleges, in which buildings were set around a focal point to promote interaction and shared knowledge among students and instructors (Leonard, 1998). American higher education campuses have been and still can be designed to be a place for student gathering and the sharing of knowledge.

When Oldenburg wrote “The Great Good Place”, the Internet was still in its early days. In 2015, the Internet is celebrating its 25th birthday and has made significant changes in the ways people interact with each other. The Internet even has given a new name to the young generation, the Net Gen, who grew up side by side with it. Environmental landscape has also changed under the influence of the Internet. Forlano (2009) described the impacts of the Internet upon the distribution of people in places using the term “codescape”, as she realized that people not only tend to gather toward places with Internet availability, but they also tend to work more in informal setting when there is the Internet. On higher education campuses, the Internet and collaborative learning styles have boosted the interest in using informal campus spaces for learning activities (Alexander, 2004; Price et al., 2003). More focal points for socializing are being created in almost every corner as students become more interested in these places.
for learning activities. Many universities have experimented with new learning spaces, including but not limited to the cafeteria, information commons or collaboratories inside and outside the libraries, living-learning spaces, and corridor niches (Oblinger, 2006). The university in my study also provided various informal learning spaces within the libraries, student centers, residential halls and academic buildings. As Radcliffe et al. (2008) put it, every square meter of the modern campus space have been designed to support learning of various types, from individual self-study to collaborative activity.

As Net Gen college students lived in the connected world of the Internet and surrounded by plenty of informal gathering spaces around campus for socializing and learning activities, they seemed to develop new habits of using public spaces. The students in my study not only frequently gathered in places on campus but also coffee shops near the campus. In my observation, coffee shops in nearby downtown were always filled with students and people using laptops to do work. It seemed that the flexibility to work anywhere supported by the Internet has made changes to the ways American adults use gathering places, or “third places”, in Oldenburg (1997)'s words. However, different from the 1997 findings by Oldenburg, in today's culture going to coffee shops like Starbucks has been considered a symbolic value for the culture of the local community (Schmidt et al., 2012; Thompson & Arsel, 2004).

As Net Gen college students grow up and enter the workforce, their preferences for flexible work schedules and work spaces would lead to the needs for more working-socializing spaces in the community. In this phenomenon, I think that American third places would be more popular in the community, but they have their own unique characteristics compared to their counterparts in Europe. American third places have
become more than just a place for socializing; they have become places for the young people like the Net Gen to work while staying connected to the community. They are the places for them to enjoy “being there” in the community (Crook & Mitchell, 2012) while “being alone together” (Turkle, 2012). American third places thus still carry the loneliness tradition of America, yet reflect their unique socializing and working in the digital age. American third places are the places for the new digital solitude.

**Chapter conclusion**

Prior studies have shown that Net Gen college students’ behaviors and perceptions of environmental factors could be the result of their overstimulated brain, caused by long periods of time interacting with digital technologies and the Internet. However, the brain has its limitation and balancing attention for multi-tasking, environmental distraction, and learning has been very challenging. Even though Net Gen college students have been actively working to find a fit between learning and informal settings, the difference between the place they learn and the place they test may affect their academic records. As the trend is to use more informal places for study and work activities, there needs to be more research about performance in these settings and strategies for students and workers to enhance performance while using informal spaces.

**Chapter summary**

This chapter discusses the findings, the relationship between the findings and the literature, and the research limitations of the study. The chapter includes the discussion of how the model of informal learning space choice and interaction relate to the literature, especially Lewin’s (1951) framework. The chapter discusses Net Gen students' perception
of distractions and privacy to provide an explanation for their interest in noise and semi-private places. The chapter also provides a discussion on the fit between the Net Gen and their informal learning environments. Next, the chapter provides a discussion on context-dependent memory, arguing that learning in informal settings while taking exams in formal settings may not be a good learning strategy. Finally, the discussion revolves around the new meaning of the American third place, when the young people prefer informal places or “third places” for study.
CONCLUSION

This study explores how students choose informal learning spaces to study, what factors influence their choices, and what adjustments they make to improve informal spaces to become better places to learn. The findings depict current college students as those who seek to balance academic achievements and social connections. They want to have good grades but do not want to miss the fun. However, depending on the requirements of the learning task, they usually adjust their needs and manage to select informal learning spaces that better support their prioritized needs. For serious learning, such as preparing for exams, they favor quiet environments. For casual learning, such as doing homework, they prefer social spaces. For random learning when they wait for classes, they do not mind noise or discomfort as long as the places are nearby the physical locations of their classes. They could sit on the corridor floors and do their last-minute preparation for classes. In general, they prefer private zones inside social settings, allowing them to stay focused on their learning tasks and keep a certain connection with their surroundings. Their favorite learning spaces are study booths and glass-door study rooms inside the student commons, study nooks along the corridors of academic halls, and soft-seating in various areas of the campus. They enjoy comfortable furniture but know they need tables for writing on, whiteboards for brainstorming, an Internet
connection for online learning resources, and power outlets for prolonging their study sessions.

**Literature contribution**

This study contributes to the current literature about the Net Gen in three major contributions.

First of all, it expands current knowledge about the Net Gen (i.e. those were born after 1980) by showing how they behave in informal learning spaces on campus. Available research identifies the Net Gen as collaborative learners, customization lovers, and entertainment seekers (Carlson, 2005; Tapscott, 2008). The Net Gen has also been described as having problems with paying attention (Carlson, 2005; Prensky, 2003; Tapscott, 2008) and as preferring frequent task switching (Levin et al., 2007). This study shows that Net Gen students are as much collaborative learners as they are independent learners. The students in this study tend to collaborate when the learning tasks required them to do so. At other times, while sitting together, they independently work on their own materials while enjoying the company of peers nearby.

A second major conclusion shows that, as much as Net Gen students love to customize things around them, it seems that they do not have much leeway in customizing informal learning spaces on campus. The most common way to customize a learning space is to rearrange tables to different sizes for different learning tasks. However, limited flexible furniture is available on campus, and such rearranging is not permitted in certain places.

A third major conclusion presents a new perspective on the attention and focus
problems of the Net Gen by demonstrating that these college students are interested in some degree of environmental distraction while concurrently studying. Buzzing background noises are found to help students stay focused on learning tasks, as they might provide students with a sufficiently subtle distraction to gently switch their attention back and forth between studying materials and environmental stimuli. This subtle distraction might help students to maintain their attention while studying in informal learning spaces for a long period of time. The study also shows that Net Gen students are very clever in managing the amount of environmental stimuli necessary for subtle, but not excessive, distraction. Students in this study make use of their headphones to control and reduce noise distractions. They also opt for semi-private zones inside social places so that the physical location can also limit the level of distractions to benefit their learning experience.

The study also contributes to the current literature about environmental behaviors as it points out that a buzzing noise may not be a distraction. Current literature shows disagreement about the effect of noise upon performance. However, it is commonly acknowledged that difficult tasks are more affected by noise distraction than simple tasks (de Korte et al., 2007; Furnham & Strbac, 2002). This study shows that the perception of noise distraction depends highly on individuals and their ability to handle noises. Some students in this study could perform difficult tasks well in any conditions, whereas some others would rather have less distracting places. In particular, students do not favor places that are extremely quiet or noisy. They prefer places in between where they can find some subtle distractions.
Implications

On a practical note, findings from this study are beneficial to education administrators, facility designers on college campuses, furniture manufacturers, parents of students, and people who care about the teaching and learning of the current college students. The values of this study are described below.

For educational administrators, the study provides an explanation for students' choices of informal learning spaces, emphasizing that their choices come from their need to balance their social life and academic life. This helps to ease the concern among adults that current informal learning trends make academic environments similar to undergraduate circuses (Bowler et al., 2010). The study also provides information that current college students, also known as the Net Gen, need social activities and subtle environmental distractions to study better. One may wonder how college students manage to study in what could be perceived as the chaos of undergraduate circuses. This study shows that Net Gen college students seek out private zones inside social settings, where they can control their distractions without being disconnected from their surroundings. They are also good at adapting themselves to different learning conditions and can always leave for different places when the amount of distraction is beyond their tolerance.

For educational designers and campus facility planners, the study provides a framework that they could use to evaluate and design informal learning spaces. The four main components of the framework: needs, learning tasks, physical environmental factors, and managerial factors could be used as reference to guide the programming of informal learning spaces on higher education campus. Particularly, the study suggests that
educational designers and campus planners provide more semi-private informal spaces because of students' preference for semi-private places. Many students in this study express their desire for study booths, study rooms, and places with some level of privacy that help them study. Lounges could become more educational if they were equipped with tables, removable whiteboards, power outlets and other amenities for learning activities. Perhaps informal learning space could accommodate educational furniture. For example, a small informal learning space inside an academic hall may provide a small sofa, table for group work, study booth, whiteboard, and drinking fountain.

Jamieson (2009) has pointed out that current practice in designing informal learning spaces on higher education campuses favors the centralization of informal learning spaces to a more limited number of student centers, libraries, and large buildings. This study shows that even though designers can provide semi-private zones inside student centers through the installations of glass-door study rooms and study booths, there is a need to decentralize informal learning spaces and provide various informal learning spaces in multiple buildings. The study reports many students make use of the empty corridors outside their classrooms for learning activities and occupy available study nooks in academic halls. Students need access to nearby informal learning spaces wherever they are without having to travel across campus. Facility designers could provide more study nooks in academic halls across campus, install benches along the corridors, provide removable whiteboards in these places, and offer more access to electrical outlets. In this way, informal learning spaces are created throughout the campus, making it easier for students to find places to study outside the classroom. This can also help avoid situations where students sit on the floors doing homework.
Most importantly, the informal learning space should be designed in locations that are accessible to many students. Preferred locations are places with sufficient student traffic, where many students recognize the informal learning spaces and use them when they have the chance. Glass-doors are preferable, as they improve students’ chances of recognizing the learning spaces, and at the same time allow students inside to have some level of connection with the surroundings. Informal learning spaces with plenty of sunlight are also preferable.

Many students in this study also seek places to rest between classes in areas that are quiet and comfortable enough for a nap or some casual reading. By providing more relaxing spaces designated for resting activities, we may avoid the images of students taking naps in public lounges where university administrators have posted “no napping” signs.

Teachers and students are free to use informal learning spaces in their own ways. Keppell (2014) suggests that one should not assume that learners have the knowledge, skills, attitudes, and ability to identify and effectively use learning spaces, nor should similar assumptions about teachers persist. To make use of informal learning spaces, teachers could plan and give lessons in informal settings. Teachers can learn how to manage Net Gen students and restrict unwanted distractions. Teachers can benefit from seeing how informal learning spaces can be optimized for in-class and out-of-class activities. Out-of-the-classroom learning can be encouraged to make learning experiences on campus more exciting. Teachers can become comfortable with bringing lessons outside the border of the universities, making the learning experience more authentic.

Similarly, students will benefit from understanding the values of informal spaces
to learn. They specifically need the skills to deal with unwanted distractions and make use of available learning amenities. Many students in this study find casual learning in social settings to be unproductive. Productivity, however, can be improved as the students acquire self-directed learning skills and skills to manage distractions in social places. Thus, students may become more productive in studying in informal learning spaces. Teachers may improve their teaching by bringing the lesson outside the classroom. Administrators may have fewer concerns about how facilities are being used when teachers and learners realize the advantage of unconventional learning place.

Campus administrators may also consider allowing more flexibility in the use of informal campus spaces. This enables students and teachers more freedom in using, adjusting, and personalizing informal learning spaces to their needs. The most important action is to inform teachers and students of the availability of certain informal facilities for public use, especially when the facilities have recently been converted for public use. This would avoid the situation where a comfortable informal learning space is available, but remains unused because few people know that it is accessible. Different policies about noises, napping, refreshments, and other issues could be applied to different zones of large informal learning spaces or to different small informal learning spaces. This allows students to have various choices of informal learning spaces and enables them to select the one that best fits their needs.

**Limitations**

There are several limitations of this study that should be mentioned. First of all, the study only focuses on the choices of informal learning spaces, which is only one
aspect of the interaction between the Net Gen and the informal learning environment. Even though the study is able to point out environmental factors that influence students' choices of informal learning spaces, there are still more aspects of the relationship between the Net Gen and the learning environment that need to be explored.

Future research may attend to the actual learning performance of students in informal learning context and measure how different environmental factors affect the learning performance of various cognitive tasks. Perhaps a quantitative research study should follow this study to confirm the lists of factors students consider when choosing informal learning places and the relationship between these factors.

Secondly, the data for this study were taken from a single American higher education institution. In order to have a more accurate picture of the Net Gen's interaction with the learning environment, there is a need to explore the choices of informal learning spaces among college students on a larger scale, across many American universities, and across universities from different countries, and across different learning contexts.

Thirdly, the data were collected using a convenience sample, or snowball sample, and are much influenced by my own friendship circle and encounters. Even though this method of data collection helped me to gain entry into the studied population and benefit from insiders' information, it shaped my data in certain direction. It is possible that other researchers who study the same student population in the same university will have a different understanding of the ways these college students interact with informal learning spaces. They may find additional categories that my limited data could not cover. For these reasons, a follow-up quantitative study on the same campus could confirm the choices of informal learning spaces and the reasons underlying them to enhance the
Fourthly, the interpretation of the data are much influenced by my own background and experience. More qualitative study about students' usage of informal learning spaces could be conducted by researchers with different backgrounds to see if we all come to the same conclusions about students' behaviors and perceptions of environmental factors in informal learning spaces. So far, my study confirms Crook & Mitchell (2012)'s findings about students' preference for being present in the community and Turkle (2012)'s findings about young people wanting to be alone together. The Net Gen tends to sit together without much interaction with each other. The unique feature of my study is that I expanded the “alone together” phenomenon by indicating why “alone” is needed. Being alone is necessary to avoid distractions and allow students to complete learning tasks. Being alone together is just an expression of how college students attempt to balance their social lives and academic lives: they want to sit together for the benefit of social connection, and they want to be alone in order to complete the learning task.

In conclusion, this study is an attempt to understand the interaction between students and informal learning environments through the lens of place choice. Despite limitations, the study expands current knowledge about Net Gen college students and provides valuable information for designers, campus planners, administrators, teachers and parents to understand the Net Gen's preference for informal learning spaces and provide appropriate informal learning spaces for them.
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APPENDICES

Appendix 1. Interview protocol

Appendix 1A. Interviews protocol (students, professors, instructors and administrators)

1. What changes have you seen happening in higher education over the past 10 years?
2. What factors do you think are influencing the way students learn nowadays?
3. How does adult learning different from ordinary college student learning? And how will adult learning change as these Net Generation ordinary college students come of age? How do educational leadership and policies address the issues of Net Generation college students and future Net Generation adult students?
4. What is your opinion about students doing formal learning in the commons areas? How do you think environmental factors (noise, visual distraction, etc.) affect student performance? What do you think are the best places for studying?
5. How do educational leadership and policies address the issues of learning commons?
6. What is your opinion about the inclusion of a common area, perhaps a coffee shop, in the middle of the library?
7. How do you think technologies affect the way students learn? What is your vision for online/distance learning? What skills do you recommend students acquire to prepare for online learning?

8. What do you think about the learning culture in the university commons?

9. How do you think informal learning spaces like this reflect the university learning culture?

10. What type of study space should the university create to foster quality learning? Do you think information commons is there to last? And why?

Appendix 1B. Interview protocol (facility planners and designers)

1. What changes have you seen happening in campus facilities now compared to 10 years ago? Why are there such changes? How are students nowadays different from 10 years ago?

2. What are the demands/challenges that campus facilities at Tiger University encounter?

3. How does the university respond to those demands?

4. How does the university perceive the role of informal campus spaces? What informal spaces are considered places to learn by the university? What types of learning activities do you expect to take place in these informal spaces? How do such roles of informal campus space transfer to the design/renovation of campus facilities? Can you show me a floor plan, picture, etc.? What is the process in designing/renovating these spaces? How do you come up with space programming and design?

5. What are the resources and constraints for renovating old academic buildings? As
a designer, what are your solutions?

6. What are the design principles for informal learning spaces held by the university? What do you think are key elements for designing a successful informal learning space? What environmental factors do you think are beneficial for learning activities (collaboration, creativity, staying focused, etc.)?

7. What newly designed/renovated informal space do you find the most successful for learning outside classrooms? What informal space do you think is not successfully designed for informal learning? Why? As a designer, what changes do you recommend?

8. What do you think about the usage of media (laptops) in informal space? How does the university incorporate that into the program and design of informal learning spaces? How about the availability of power outlets?

9. How do you think space can accommodate different learning styles? How have campus facilities responded to learning styles in their design?

10. Would you share with me some of the university's future plans for learning spaces, particularly informal learning spaces?
Appendix 2. Pre-interview demographic questions

1. What is your gender?
   - Male
   - Female

2. What is your age range?
   - 8 to 24 years
   - 25 to 34 years
   - 35 to 44 years
   - 45 to 54 years
   - 55 to 64 years
   - Age 65 or older

3. What is the highest degree or level of education you have completed?
   - High school graduate (includes equivalency)
   - Some college, no degree
   - Associate's degree
   - Bachelor's degree
   - Ph.D.
   - Graduate or professional degree

4. What is/was your major? ___________

5. Do you have internet at home? Yes/No

6. Where are your favorite learning places outside the classroom?
Appendix 3. Observation protocol

1. Time
2. Location
3. Notes about design
4. Number of people
5. Individual
6. Group
7. What activities are happening there?
8. How do they interact with environment parameters?
9. Furniture
10. Noise
11. Lighting
12. Outlet
13. Others (computers, refreshments, etc.)
Appendix 4: Examples of semi-behavior mapping

Semi-behavior mapping were conducted at the same time with observation. Using observation protocol as the guidelines, notes about designs, activities, events, etc. were taken on a layout of each informal learning space. Each semi-behavior map consists of date and time of observation, furniture layout, indicators of windows and columns, indicators of seat occupations, and notes about noise levels, activities, behaviors of students, etc.

Appendix 4A. A behavior map of Paleo Student Center's common area.
Appendix 4B. A behavior map of Mega Library's common area

Appendix 4C. A behavior map of Mega Library's quiet study area
Appendix 4D. A behavior map of Limestone Hall's lounge
Appendix 5: An example of open coding on interview transcript

{lib}Outside the classroom I usually go to the union or I like to go to the Section sciences library {notnoisyquiet}Because Mega library is almost too quiet for me. So I need a little bit of noises and Section Library has been amount of noise that I need{/lib}

{notnoisyquiet}. What about the union?

{notnoisyquiet}The Paleo Student Center is kind of noisy but I like that little bit of noise as well. I think that my friends and I tend to be more in that area than here. Oh if I sit in the Student center, I tend to people watch rather than work. {/notnoisyquiet}

Why are you here today?

Actually I'm not studying here today. {quiet}I actually just discovered that this place is quiet. I'm actually going to an event and I'm waiting for my friends to get here. {/quiet}

When is the event?

It's actually an event for the American Asian Association. With bringing a guest speaker. So we brought him in and he will be here in about an hour.

Is the meeting going to be here in this area?

It is going to be upstairs in the second floor.

You choose to be here downstairs instead.

{comfort}I think because the first floor is loud. Up in the top floor. I don't know I just feel comfortable in couches and chair and it is not really study oriented space. And I just pop here. I just didn't think I would get a table{/comfort}

And what are you working?
It is actually an introduction I'm supposed to introduce him. Just copying it down from the computer onto a note pad.

So you are trying to remember the scripts, right?

And it is too loud upstairs to do that.

And how often do you come to Paleo Student Center or Section Library to study?

It's not too often. I usually study in my room. I usually come here 2 or 3 times a week.

And go there and maybe study.

What factors in the environment that attract you to a place.

{socialstudy} For Paleo Student Center a lot of people who I go to class with tend to go over there, so we all in the same kind of environment so if we have questions we just look at each other across the room like do you understand it. {/socialstudy}

{lib} {private} But as far as Section library goes, I like that they have cubicles, and it kind of blocks out all the other noises and a big factor for me is I don't like to study in super big open space where like people would be watching me or eating stuff. I don't like that. So if it is just a cubicle, it is just me and my study. {/private} {/lib}

What media you usually bring along?

Most of the time my computer. Because most of my work is on computers. Either that or my phones. I usually have my phone in case that someone calls me or text me or want to get a hold of me. And I think that's all about it.

{phone} You use mobile devices to study?

No never to do a test or anything like that. If I ever have to use my phone to do school stuff, I do my computer has died or I forgot to my computer. I don't like to use phones to take quizzes, to do tests or something like that. {/phone}
What do you think about the outlet over here?

That outlet problem is very real. That is also another reason why I don't like studying here. Because the outlet is concentrated around certain areas. And those are always crowded to find plug in.

where are they in this building?

If it is upstairs is usually against the wall every so often. And the tables are usually arranged in a way where you can't get to them. So it's hard to stay plugged in when I'm in a place like this. At Paleo Student Center, the outlet is a little more spread apart. Or in Section Library, each of the cubicle has its own outlet. So I know wherever I sit, I am able to plug in a computer.

What do you think about a typical college student?

I think that my parents definitely have more emphasis on memorization. And I think this hasn't changed much. Just think about all the textbooks that I buy and the materials I am assigned and how much I actually don't do them. So everything is the pan on the type of materials to study for the exam. I think that we are given more work that we can do during a day. You know we are given ways more work. I heard somewhere that a college student has enough work to do for 26 hours and we only have 24 hours a day. So you really need to choose what is important to you. You are really going to read the textbook or you are going to really read materials they give you.

Usually you don't do both?

I don't have enough hours to do both.

What aspects of this building that you think supporting to learning?

I think what is useful about the students center is there
are a variety of spaces. Like down here it is just absolutely quiet. So if you really want to study something, this is the place to come vs upstairs some people need a lot of background noise to be able to look up everything and get back to study. And on the top level, it is background noise but it is not completely quiet. So there are different levels for different learners. {/varietyofspace} {/studentcenter}

And what you don't like the space?

{studentcenter} I don't think that there is much that I don't like other than how sometimes it is extremely crowded. Days good time to study and bad time to study {/studentcenter}. When is a good time and when is the bad time?

{crowding} {studentcenter} The good time is the evening. So anytime after 4 or 5 o'clock when everyones goes home. People live on apartments take a bus and go home. And those who live on campus able to come back to use tables, outlets and stuff. During the day time, you don't even think to come here to study. {/studentcenter} {/crowding}

What else do you think that this facility should provide you?

{studentcenter} {suggestion} I don't know if there is much else that they could provide. I think that it is just the stress of having a lot of students that use it, especially when it is at central place. So even if they do upgrade or add more of this, or add more of that, that just attract more students to come over here. So you gonna have the same problems, just the amount of students that need the same resources, {/suggestion} {/studentcenter}

{residential} Do you study in the lounges of academic building?

I personally live in a residential hall and we have study rooms and things like that but on that level of the building it is very noisy. I don't like to go into the study room because it's no different than being in my room. My room is actually further away from the common
Have you ever studied in the hallway?

Yeah. In the hallway, I think it does have benefits. But when you are sitting in the hallway, you definitely be bother, and you kinda know where the noise is coming. There are times when people are coming out or in a class. So you can guarantee an hour or an hour and a half of quiet while people are in class. As college student, we don't always need tables to study. Sometimes, it is easy to just stop and sit down and study somewhere?

Have you ever studied like that? How do you feel? Can you focus as in the Section library?

I don't know. If I have to rank it, I would put the health library first.

When you sit in the hallway, you see people walking back and forth, and that is bothersome. This is the walkway, that is its number 1 function. The walkway is for walk, so people gonna walk, they don't care that you are sitting there. You care, but they don’t care. That's definitely a big thing. I don't really do it that much but I do when I need to.

Thank you
Appendix 6: A list of open codes

Academic building, active learning, adapt, aesthetics, alone, alone with friends, anytime anywhere, a surface, between class, buzzing noise, can't focus, change environment, checking emails, classroom stigma, closer, coffee shop, collaborate, comfort, comfort does not matter, comfy, comfy furniture, computer, context, couch, crowding, depend on study task, designate area, distract, do nothing, don't know, down town coffee, finding space, flipped, focus, for resident only, frequency, get into the mood, goal of education, going to class, habit, headphone, homework, library, homely, home study, human social, interview, know people, lack of quiet nook, learning book, learning style, library stigma, lighting, like noise, logical space, lounge, mark seat, manage info, meeting place, meeting room, money, moving table, multi-purpose, music, nap space, near, nervous, new furniture, no laptop trend, no learning with friends, no more couch, no napping sign, non-serious, nook and crannies, nooks, no people inside study room, no sign, not bother people, not informed, not loud, not noisy not quiet, not so intense, not too comfy, old design, openness, open time, outlets, ownership, people walk distraction, people watching, phone, private, problems, quiet, quiet hallway, relax, refreshment, research lab, residential, serious learning, social space, social study, space design, spread out, student center, study booth, study hallway, study last minute, study parties, study room, study room design, study together, study with friends, suggestions, table, technology impact, telespace, test, too crowded, too loud, traffic, trapped space, typical student, variety of space, wall color, windows
Appendix 7: A list of axial codes

*Person*

Task: goal of education, active learning, depend on study task, study the last minute, non serious learning, serious learning, test, collaboration

Style: habit, typical student, learning style, frequency, academic, social

Technology: computer, headphone, phone, checking emails, any time any where, no laptop trend,

*Environment*

Setting: social space, social study, going to class, between class, quiet hallway, study room, logical space, designate area

Noise: like noise, too loud, not loud, not noisy not quiet, music, lack of quiet nook, buzzing noise, not so tense, relax, bother people, nervous, quiet

Light and color: windows, wall color, lighting

Crowding: too crowded, crowding, people watching, human social, traffic

Privacy: private, distract, alone, people walk distraction, no learning with friends

Personal space: alone with friends, study parties, study together, study with friends,

Territoriality: mark seat

Distance: context, near

Management: for resident, no sign, manage information, know people, not informed, no napping sign, opening time, classroom stigma, library stigma, ownership

Furniture: new furniture, comfy, not too comry, couch, comfort, comfy furniture,
no more couch

Refreshment: downtown coffee, coffee shop, money, fountain

Like: outlets, nook and crannies, nap space, study booth, a surface, table, homely,

spread out

Action

Finding space, change environment, adapt
Ngoc Vo was in the Teachers of English program at Vietnam National University, Hanoi when she became interested in how physical settings and technologies influence learning activities. She later acquired a Master Degree at College of Education in 2009 and a Doctorate Degree at Department of Architectural Studies in 2015 at University of Missouri-Columbia. Her research focuses on how to use physical environments to enhance learning and teaching at college level.

Ngoc worked as an usability researcher at the Information Experience Lab, University of Missouri, Columbia from 2007 to 2009. It was there where she mastered designing websites and online learning programs. In 2010, using her learning system design skills, she collaborated with the Writing Center at University of Missouri, St.Louis to design a Second Life virtual writing lab. In 2012, she was hired by Educational Technologies at Missouri to design Campus Technology Survey and support Blackboard’s course designing and troubleshooting. During this time, she worked with faculties from various disciplines to design and implement online courses.

Having trained cross-disciplines from language, education, to architecture, Ngoc has acquired a unique skill set that enable her to design, implement, and supervise interdisciplinary learning projects successfully. She enjoys using her unique skills to assist teachers from various fields to improve their courses.