Designing for the Future:
A Post-Occupancy Evaluation of the
Peter Jones Learning Centre

by
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Abstract

This exploratory study examines the Peter Jones Learning Centre’s (PJLC) transition from a quiet, autonomous interior to a learning commons model encouraging collaboration and socialization. Located at University of the Fraser Valley (UFV) in British Columbia, the PJLC has been revitalized to support new learning theories, in addition to providing a hub for students’ involvement and engagement on campus. Research in the planning, function, and utilization of non-formal learning environments is limited, therefore the study’s purpose is threefold: first, to gain insight as to administrators’ perceptions and observations of student learning in non-formal learning space; second, to understand how administrators implement their understanding of learning into the planning, design, and operation of the PJLC; and third, to examine the transactional relationship between the learning environment and learner.

Using the post-occupancy evaluation, ten semi-structured interviews were conducted, including five administrators influential in the PJLC design and space programming, and five learners who had utilized the facility over the course of their studies. The space performance evaluations conducted assessed the PJLC’s technical, functional, and behavioural features. This was followed by structured observational sweeps that included the documentation of 1,943 campus members’ location, activities, gender, and sociological grouping preference.

Administrators’ describe student learning in non-formal learning space as technologically supported, socially driven, and multitask-oriented and explained that they integrated their understanding of student learning in the PJLC’s space programming, physical design, policies, services, and resources provided. The space performance evaluations demonstrated how the PJLC’s setting functioned and identified structural and environmental features that supported and hindered students’ use.

Learners interviewed described that the PJLC’s physical design, operation, services, and resources provided were influential in their use of the facility. The observations conducted of campus members’ utilization of the PJLC document a series of social and activity patterns within the building. The study’s findings suggest further research in areas such as gender preference of learning space, integrated planning and research, environmental assessment, and inclusive learning environments that accommodate students with special needs.

Keywords: Learning environment; post-occupancy evaluation; learning commons; non-formal learning space
Dedication

To my dogs, Beau and Max, thank you for keeping my lap warm during this ride.
Acknowledgements

The completion of my dissertation has depended largely on the commitment and assistance of several others. I would like to take this opportunity to express my sincerest appreciation to my senior supervisor, Dr. David Zandvliet, and co-supervisor, Dr. David Paterson, for their time, guidance, and valuable feedback during the planning and development of this study. Their support and enthusiasm in my research was a source of great encouragement. I would also like to thank my external and internal examiners, Dr. Raymond Cole and Dr. Kris Magnusson, for their participation and investment in this process.

My special thanks are extended to the administration and staff of the University of the Fraser Valley for their willingness to participate and assist me during my data collection process. I am also indebted to UFV’s Campus Planning department for their cooperation and permission to use their facility floor plans and campus maps in my dissertation.

I sincerely appreciate the counsel of Dr. Peter Jones and Dr. James Christianson. The advice they gave helped to guide and inform the development of my dissertation.

I am particularly grateful for the editorial and technical assistance provided by Grace and John Pizzuti. Their attention to detail and useful suggestions assisted me in producing a piece of work that I am proud of.

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## List of Acronyms

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<th>Description</th>
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<tbody>
<tr>
<td>FVC</td>
<td>Fraser Valley College</td>
</tr>
<tr>
<td>PEB</td>
<td>Person-Environment-Behaviour research</td>
</tr>
<tr>
<td>PJLC</td>
<td>Peter Jones Learning Centre/Commons</td>
</tr>
<tr>
<td>POE</td>
<td>Post-Occupancy Evaluation</td>
</tr>
<tr>
<td>SPE</td>
<td>Space Performance Evaluation</td>
</tr>
<tr>
<td>UCFV</td>
<td>University College of the Fraser Valley</td>
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<tr>
<td>UFV</td>
<td>University of the Fraser Valley</td>
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</tbody>
</table>
Glossary

Autonomous Learning refers to “a habit of mind, expressed through a range of activities and skills, acquired and developed through practice” (Crome, Farrar, & O’Connor, 2009, p. 6).

Case Study refers to a research strategy that concentrates on understanding the dynamics present within a single setting (Eisenhardt, 1989).

Collaborative Learning is defined as a process in which students work together in groups towards a common goal (Prince, 2004).

Environmental Psychology is defined as “the study of the relationships between behaviour and experience and the built and natural environments” (Bell, Greene, Fisher, & Baum, 2001, p. 4).

Exploratory Research is defined as a “broad-ranging, purposive, systematic, prearranged undertaking designed to maximize the discovery of generalizations leading to a description and understanding of an area of social or psychological science” (Stebbins, 2001, p. 3).

Formal Learning Space is described as an environment that is controlled by scheduling requirements, set hours of use, set numbers of seats, and prescribed learning activities (Johnson & Lomas, 2005, p. 16).

Learning Environment is defined as “the complete physical, social, and pedagogical context in which learning is intended to occur” (Bernard, 2012, p. 12).

Non-Formal Learning Space refers to a setting that is undesignated, unscheduled, and frequently accessible during most days and hours of the week for learning activities (Acker & Miller, 2005; Diaz, Brown, & Salmons, 2010; Johnson & Lomas, 2005).

Place-Centred Activity Mapping is defined as a method that documents the behaviour of all individuals within a specified place and time (Sommer & Sommer, 2002).

Post-Occupancy Evaluation is a systematic process of assessment that examines a building’s performance as defined by several factors, including meeting occupant expectations and satisfaction (Blyth, Gilby, & Barlex, 2006; Preiser, 2001).

Space Performance Evaluation is a systematic assessment to inspect the technical, functional, and behavioural features of a specific space to determine to what extent it has met its design goals (Blyth, Gilby, & Barlex, 2006; Preiser, 2001).

Student Engagement refers to students’ behavioural, emotional, and cognitive investment during their academic pursuits (Fredricks, Blumenfeld, & Paris, 2004).

Student Involvement is described as the amount of physical and psychological energy that a student devotes to the academic experience (Astin, 1999b, p. 518).
1. Introduction

This dissertation is an exploratory study in the planning, design, and use of the Peter Jones Learning Centre (PJLC) at the University of the Fraser Valley (UFV) in British Columbia, Canada. Using a multiple methods approach, this investigation is based on the interviews conducted with administration and the direct observation of students utilizing this non-formal learning space. The first chapter of this dissertation explains my personal interest in the study, the background of the study, describes its significance, and presents a brief overview of the research methods used. The chapter concludes by noting the delimitations, limitations, assumptions of the study and providing an organization to the thesis.

1.1. Author's Background

During the first year of my doctoral studies, I was employed as a research analyst with the University of the Fraser Valley (UFV) Institutional Research and Planning (IRP) department. My role included providing environmental scanning, composing accountability and strategic reports, and analysing student data for senior administration. In 2007, UFV Administrators proposed a series of campus renovations designed to support the setting’s transition to a university. It was during these discussions that I began to question what was informing and directing the process of campus planning and how these environmental changes were going to influence students’ perceptions and behaviour on campus.

In response, UFV’s IRP department initiated and conducted the study Campus Snapshot: A qualitative study on the perceptions of students at the University College of the Fraser Valley that catapulted students into the campus planning dialogue, voicing their ideas about space, and identifying their environmental needs (Pizzuti-Ashby & Alary, 2007). The results of the study emphasized how instrumental and influential
UFV’s physical environment was in communicating the institutional support of students’ educational experience. The study also served as a platform for students to explain their concerns about the current campus environment and contribute suggestions as to how to address these issues. During the study’s follow-up dialogue between administrators and students, administrators described their desire to mend the disconnect between students and the campus’s built environment by designing spaces that encouraged greater use and addressed students’ needs. Changes included creating non-formal learning spaces that were accessible, comfortable, aesthetically pleasing, and flexible to students’ individual and group learning objectives. Providing students with an additional food and beverage service was also suggested to meet the campus demand for more food options. These renovations discussed were later completed during 2008 and 2009.

The findings of *Campus Snapshot* (2007) encouraged further inquiry into administrators’ perceptions of learning outside the classroom environment and how students’ learning activities were being supported in non-formal space. Since the PJLC’s refurbishment in 2008, I was interested in students’ reactions and usage of the largest building dedicated to non-formal learning space on UFV’s campus. This dissertation was an opportunity to explore the topics that were raised in my former study and to continue the dialogue on the planning, design, and utilization of these dynamic environments.

### 1.2. Background of the Study

The university campus is a distinct ecology in that its intentions are to provide a place for people to gather and learn. The setting, comprised of both symbolic and functional features, conveys to members their institutional culture and values (Chapman, 2006; Kenney et al., 2005; Oblinger, 2005; Riddle & Souter, 2012; Strange & Banning, 2001). Resulting from this interaction is an exchange that informs and influences both learners and their physical space (Kenney et al., 2005; Lippman, 2010; Strange & Banning, 2001). Interest in this student-environment relationship has emerged as institutions aim to bolster their student engagement, learning outcomes, first-year retention, and sustainability of their facilities (Chapman, 2006; Kuh, Kinzie, Schuh, & Whitt, 2005; Reynolds, 2007; Walton & Galea, 2005).
Scholars agree that our understanding of learning within the context of post-secondary education has also shifted (Brown & Long, 2006; Prince, 2004). Institutional paradigms regarding the delivery of content are beginning to adopt a student-centred approach (Barr & Tagg, 1995; Diaz et al., 2010; Johnson & Lomas, 2005). In addition, research indicates that students actively involved in their learning process experience greater gains in the retention of content (Bonwell & Eison, 1991; Prince, 2004). Providing formal and non-formal spaces that support active learning – such as collaborative, cooperative, and problem-based approaches – have become increasingly important, as studies suggest that engagement in these activities positively influences student learning outcomes and success (Astin, 1999a; Jamieson, 2009; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

Technological advancements have also influenced environmental design (Brown & Long, 2006; Cunningham & Tabur, 2012; Jamieson, 2009; Oblinger, 2006; Zandvliet & Straker, 2001). Current technology has mobilized instructional content and lectures, providing the opportunity for learning and collaboration from any geographical location (Oblinger, 2005). As a result, the campus environment, in its entirety, is being redefined as a learning environment and altered to accommodate this digital age (Brown & Long, 2006; Oblinger, 2006).

However, learning environment researchers have focused primarily on formal learning space, such as the classroom, due to the perceptions that this is where education happens and that the formal learning process is superior to the learning that occurs outside of the classroom (Smith, 2008). Advantages in investigating formal learning spaces include greater research controls and data available to assess the relationship between students and their learning space – such as grades, attendance, retention, persistence, and teaching evaluations (Blackmore, Bateman, O’Mara, & Loughlin, 2011). Furthermore, the classroom’s physical setting, designed and utilized for the delivery of content, supports instruction and designated learning activities that allow the researcher to assess the instructor’s behavioural expectations and learning outcomes of students (Fraser, 2001; Moos, 1979; Veltri, Banning, & Davies, 2006; Villar & Alegre, 2007).
The dominance of formal learning space in the literature has resulted in a narrow perspective of the role that the surrounding campus environment has on students’ learning experience. In the academy, learning has been traditionally evaluated in the classroom and defined as an acquisition of knowledge products. Given the recent advancements in understanding how people learn and the mobility of learning content, researchers are now considering the influence non-formal learning environments, including the library, the campus green, the cafeteria, and campus residences, have on student learning, involvement, and engagement (Hussain & Adeeb, 2009; Kuh & Gonyea, 2003; Kenney et al., 2005; Oblinger, 2005, 2006). Research has found that these non-formal learning environments play a vital role in contributing to what an individual “knows, believes, feels, or is capable of doing” (Falk & Dierking, 2000, p. 12). However, given the unstructured nature of these places, the challenges posed to researchers investigating non-formal learning space are how to define, measure, and assess learning in a self-directed context.

For the purposes of this study, learning is defined by the academic and social activities that students are engaged in and measured by observing students’ behaviours exhibited within a non-formal learning space (Matthews, Andrews, & Adams, 2011). Astin’s (1984) Theory of Involvement proposes that students experience greater gains in learning and personal development if they are both academically engaged and socially connected with members of the campus milieu (Astin, 1975, 1984). These activities include interaction with faculty and peers, participation in student groups, and academic involvement outside of the class (Astin, 1996). Astin (1999b) further explains that a student’s degree of learning and development is dependent upon the quality and quantity of time and effort devoted to these academic and social activities (Astin, 1999b).

Campus buildings provide the structure and context for students to engage in activities supportive of their learning experience (Kenney et al., 2005; Oblinger, 2005, 2006). As campus space is built and renovated to support and nurture learning, the library, in concept and design, is experiencing the greatest transformation. For many campuses, the library serves as a centre for non-formal learning space and “the physical manifestation of the core values and activities of academic life” (Kuh & Gonyea, 2003, p. 256). Historically, the spatial layout has been planned to accommodate and organize information for the purposes of individual research and exploration (Larsen, 2010).
However, today’s library includes greater functionality, and the ability to accommodate this digital age so as to encourage a wide array of learning and social activities (Accardi, Cordova, & Leeder, 2010; McCarthy & Nitecki, 2010; Webster, 2010).

Revitalizing the library into a learning commons involves incorporating a variety of spaces designed to support group and individual use, student services, technology, retail shops, and faculty offices (Accardi et al., 2010; Cox, 2011). Learning commons have become a place for the campus “to nurture the diversity of human contact and to build a learning community beyond the classroom” (McCarthy & Nitecki, 2010, p. 2). Non-formal settings thus encourage self-directed and collaborative learning where students have greater latitude and choice in utilizing and modifying their environment to meet their learning preferences (Accardi et al., 2010; Webster, 2010).

The learning commons’ “hubs” serve as optimal sites to observe students actively engaged in the learning process, in that these facilities often comprise the largest space dedicated to supporting both formal and non-formal learning activities. Lewin’s (1936) research on the person-environment-behaviour dynamic provides a theoretical foundation to explore the influence that learning environments have on students and the administrators that govern them. Lewin’s Field Theory (1936) suggests, “to understand or to predict behaviour, the person and his environment have to be considered as one constellation of interdependent factors” (p. 338). This study utilizes Lewin’s Field Theory to examine the relationship between the planning and design of space and its resulting function and utilization.

1.3. Purpose of Study

Lippman (2010) asserts that the examination of learning environments is necessary in order to “understand how they function” and the behavioural patterns that they create (p. 4). The purpose of this study is to observe student use of non-formal space and to understand how the technical and functional aspects of the building’s design support or discourage students’ activities that contribute to their learning experience. Further, Temple (2007) states “literature throws almost no light on managerial decision-making about space issues affecting students or staff” (p. 8).
Therefore, this investigation also explores the planning and design process of a non-formal learning environment in order to better understand how this multi-functional facility is informed and shaped to reinforce the students’ educational objectives.

1.4. The Research Questions

Through learning environment research we can inform the planning process and design future spaces that are more supportive and conducive to learning (Bennett, 2009; Lippman, 2010; Moore & Wells 2009; Nixon, 2009; Stark & Samson, 2010). The assessment of space and understanding its utilization are key in meeting current and future educational objectives (Oblinger, 2005; Temple, 2007). Therefore, the study explores three main areas of inquiry: design, function, and user experience.

1.4.1. Design

Modifying and adapting campus space is a complex process. It requires those responsible in space planning to understand users’ learning needs as well as the physical infrastructure necessary to support the intended activities. Research indicates that administrators’ perceptions and observations of students learning outside the classroom play an integral role in informing the design of these spaces (Barber, 2006; Davis & Shorey, 2006; Lombardi & Wall, 2006; Neame & Lomas, 2006; Potter & King, 2006). Therefore, this study’s first question asks:

1. What are administrators’ perceptions and observations of student learning in a non-formal learning context?

1.4.2. Function

Emphasized by Veitch and Arkklen (1995), “The efficiency with which humans function is determined in large part by the limitations and proscriptions of the designed environment” (p. 316). Learning commons are unique, multi-functional environments planned to serve a variety of user groups and intentions. Furnished with cafés, computer labs, book reserves, research stations, study carrels, and group rooms, these buildings intersect spaces to foster academically and socially dynamic settings. The
second and third questions of this study address the transition from conceptualizing to contextualizing student learning by inquiring:

2. How do administrators implement their understanding of student learning into the planning, design, and operation of the PJLC?
3. How does the PJLC perform as a learning environment?

1.4.3. User Experience

Campus members’ experience in non-formal learning environments is vitally important in how the university is perceived in supporting students’ learning objectives. In addition, information regarding students’ usage of facilities helps to inform the current and future transitions of campus facilities. To understand the features of the PJLC that influence students’ learning activities and to gain insight into their use, the final questions are:

4. What are learners’ perceptions, observations, and experience using the PJLC?
5. What are the patterns of student space usage in the PJLC?

1.5. The Significance of the Study

The study addresses four major gaps in the current literature that include: understanding student use and behaviours in non-formal learning spaces, the investigation of administration’s planning and design of learning space, the examination of multifunctional buildings as learning space, and the evaluation of educational facilities post-occupancy (Temple, 2007).

Research in education has been slow to recognize the importance and influence of the physical context in which one learns. As a research community, we’ve gathered little evidence regarding how students utilize formal and non-formal learning space, and the influence space has on students’ ability to engage in activities that lead to greater academic and social involvement (Cox, 2011). These spaces include designated learning spaces such as classrooms and laboratories, in addition to non-formal venues such as learning commons, libraries, cafeterias, and student residences (Chism, 2006).
Understanding how a building evolves to meet the changing needs of today’s students is an undertaking not fully explored in current literature (Blackmore, Bateman, Loughlin, O’Mara, & Aranda, 2011). Few formal studies have been conducted investigating the planning and design of learning spaces, the decision-making processes involved, and the relationship between administrative perceptions of student learning and the outcomes of such observations (Temple, 2007). The examination of multifunctional buildings is also understudied (Cox, 2011). Student unions, learning commons, and student centres are spaces that house a variety of services intended to meet a diversity of needs though little is known about how these spaces function and the benefits they provide users (Cox, 2011).

Assessment in the function, use, and satisfaction of post-secondary facilities is relatively recent. Research indicates that post-occupancy evaluations on educational facilities began to surface in the 1960s; however, these studies were predominantly conducted for internal use and not publicly disseminated (Preiser, 1995). Sharing information with the planning and design community provides these professionals with examples demonstrating the relationship between the design of space and its role in learning (Chism, 2006). Although this study focuses on UFV and how students utilize the PJLC, it may also assist post-secondary institutions in evaluating the actual usage and performance of their non-formal learning environments.

### 1.6. An Overview of the Research Methods

This exploratory study is a qualitative inquiry into both the design of non-formal learning space and the relationship between students and their learning environment at the PJLC. The methodology selected for this study is the post-occupancy evaluation (POE). The POE provides a framework specifically designed to assess the built environment, its design objectives, and the experiences of occupants. Resulting from this process, are a series of recommendations to encourage a greater person-environment-behaviour (PEB) fit (Zeisel, 2006).

The POE provides those involved in the design, planning, and development of facilities insight into the perceptions and behaviour of those that inhabit the space
(Preiser, 1995; Zeisel, 2006). The use of the POE has also been shown to be an effective instrument in assessing the campus learning environment (Spooner, 2008; Zeisel, 2006). The POE commonly consists of multiple methods and investigative techniques including the use of surveys, observations, and interviews to assess the function of a building, and thereby inform stakeholders of the changes necessary to improve its intended use (Preiser, 1995; Zeisel, 2006).

This study utilizes the POE framework consisting of semi-structured interviews, casual and structured observations, place-centred activity mapping, photography, and institutional archives. These methodologies are used to describe the planning, design, function, and utilization of the PJLC’s learning environment following its recent renovations. A more detailed account of the research methodology is provided in chapter 3 of this dissertation.

### 1.7. Delimitations of the Study

Delimitations are defined as those restrictions of a study that are chosen by the researcher to define the parameters of the investigation. The delimitations of this study include:

- The study is confined to the Peter Jones Learning Commons (PJLC), opened in 1995, and situated at the University of the Fraser Valley in British Columbia, Canada.
- The observations conducted in this study are delimited to students who utilized the PJLC during the winter term of 2011.
- The study was delimited to interviewing five administrators who were intentionally selected based on their expertise in the design and planning of the PJLC, and five students who were selected because of their expertise observing and using the PJLC before and after substantial renovations to the building.
- Participants’ responses are confined to their perceptions, observations, and personal experiences in designing, planning, and utilizing the PJLC.
1.8. Limitations of the Study

Limitations are those conditions of the study that the researcher has no influence over. The limitations of the study are as follows:

- As the study only assesses one building located at a single university in Canada, limited assumptions or extrapolations should be made toward the assessment of similar facilities; furthermore, the uniqueness of this specific context makes it difficult to replicate in another environment (Creswell, 2003).

- A total of ten interviews were conducted. Five current and former UFV Administrators were purposively selected based on their expertise in the design and planning of the PJLC. Five current students, who concurrently served as UFV staff, were also interviewed based on their expertise in using the PJLC before and after renovations to the facility. Due to the small and unique interview sample, results of the interviews should not be generalized.

- The interview questions were developed based on a review of the literature and expert opinions. Focus groups with administrators or students were not conducted.

- As a former employee of UFV, my relationship with the interview participants may have influenced their responses or I may have exhibited my own bias.

- Due to time constraints, I may not have observed all students using the PJLC during the course of my observations. This inability to account for all activities conducted in the space may have skewed my results.

- As the sole researcher conducting the structured observations, there was no external validating source employed to confirm the behaviours that I coded. This may have resulted in inaccuracies or discrepancies in the observational data that I collected.

1.9. Assumptions

The assumptions are those aspects of the study that the researcher believes to be true. The following are assumptions that were made during the execution of the study:

- It was assumed that interview participants responded to the questions honestly and to the best of their ability.

- It was assumed that students’ behaviour in the PJLC was not directly influenced by my presence and observation of them.
1.10. Anonymity and Confidentiality

The research conducted in the fields of Architecture, Building Sciences, Environmental Studies, Interior Design, and Resource Management often identifies the structure and setting of the study. This is due, in large part, to the focus of the investigation being on a particular place and attempting to understand the dynamics of that unique environment. However, the discipline of Education frequently conceals the context of the research, providing only a few general descriptors of the institution under review.

The nature of this study and the methodology employed distinguish the institution and the facility under investigation thereby identifying it to the reader. However, the interview participants and those campus members observed utilizing the PJLC are not identified in name, nor is their likeness distinguishable in the photographs taken of the facility. Furthermore, this study was granted ethics approval by both Simon Fraser University and the University of the Fraser Valley.

1.11. Structure of the Thesis

The thesis begins by providing a theoretical foundation and framework on learning environments and the significance of context in supporting students’ learning activities and overall academic success. The study proceeds with post-occupancy evaluation of a campus and its primary facility dedicated to non-formal learning. Chapter 1 identifies and defines the nature of the problem, and emphasizes the importance that this research makes to the literature and empirical studies conducted in the discipline.

Chapter 2 reviews the literature in learning environments and identifies the theories that have evolved and contributed to our understanding of the person-environment relationship in the academic setting. The section proceeds to discuss the empirical research that has investigated formal and non-formal learning space and identifies the design variables influencing student behaviour. The review concludes with the methods of assessment used to evaluate learning environments.
Chapter 3 presents the methodology. This chapter provides a comprehensive outline covering the research perspective, type, and methods employed during the study. This is followed by an explanation of the case campus, PJLC facility, and the selection criteria of the interview participants. Concluding the chapter is a detailed description of data collection and techniques employed for analysis.

Chapter 4 introduces the first of three segments presenting the results of the study. The chapter begins with the approach undertaken to analyze the interview content and provides the analysis for the interviews conducted with administration and students. This chapter concludes with a discussion of the findings on the perceptions and observations of administrators and learners.

Chapter 5 provides the second segment of the results focusing on the data obtained during the study’s casual observational period. This chapter describes how the data was gathered and synthesized into a space performance evaluation designed to assess the relationship among the technical, functional, and behavioural aspects of the activity zones identified in the study. Supplemented by a series of photographs illustrating each area, the chapter summarizes the findings of this data to better understand how the space is performing as a learning environment.

Chapter 6 addresses the result’s third and final segment pertaining the structured observations conducted in the study. Documenting campus members’ activity, physical location, sociological grouping preference, and gender, this piece illustrates the quantitative data gathered while performing observational sweeps of PJLC. The chapter is completed with a synopsis of the findings on students’ patterns of usage.

Chapter 7 concludes the thesis with an interpretation of the study’s results and its implications for designing non-formal learning environments. Revisions to the study and suggestions for improvements are also address in this segment. The chapter ends with a series of recommendations for future research.
2. Literature Review

The shift in viewing technology and social interaction as the primary vehicles of information sharing has had a dramatic impact on the mission, design, and function of the university library (Bonnand & Donahue, 2010; Hussong-Christian, Rempel, & Deitering, 2010; Lippincott, 2008; Temple, 2007). From a place dedicated to individual research and book preservation to a collaborative, multi-functional facility, the library has evolved into the learning commons, providing students with a socially dynamic and technologically-driven environment in which to engage (Holmgren, 2010; Hussong-Christian et al., 2010). The learning commons is a relatively recent concept, frequently described as “a full-service learning, research, and project space” tasked with the role of connecting users to learning resources and tools; providing and integrating technology and services within the environment; and supporting the relationships between members of the campus community (EDUCAUSE, 2011).

Physically, these facilities are adopting an open space layout, integrating cafés, lounges, computer stations, and individual and group study spaces with flexible and versatile features to foster a seamless learning environment (Accardi et al., 2010; McMullen, 2008). Furthermore, student services, such as tutoring, are now being incorporated to provide campus members with access to expertise and a variety of resources assisting them in fulfilling their educational objectives (Holmgren, 2010). Subsequently, these facilities have experienced significant renovations to blend the physical, functional, and behavioural features expected of 21st century learning environments (Accardi et al., 2010; Holmgren, 2010).

For many universities, the learning commons is the largest facility dedicated to non-formal learning space. As campuses invest in these vital structures to support the academic community’s engagement, learning, and research, empirically speaking, little is actually known about the planning and implementation process, as well as the behavioural outcomes in these non-formal learning contexts (Blackmore et al., 2011;
Non-formal learning environments are challenging to assess as they are located outside and are typically undesignated and unscheduled (Acker & Miller, 2005; Diaz et al., 2010; Johnson & Lomas, 2005). Due to their spatial and temporal flexibility, these environments are also frequently accessible to students though transient in use. For researchers, the impermanent nature of the space also creates difficulty in determining the impact of the setting on an individual’s learning activities.

Astin’s (1984) Theory of Involvement proposes that the “quality and quantity of student involvement will influence the amount of student learning and development” (Astin, 1984, p. 297). Time spent on campus engaged in activities that reinforce educational objectives and members’ relationships are critical in the learning and development of students, as are the facilities providing the physical context for these academic and social activities to occur (Astin, 1984; Strange & Banning, 2001). Biggs (1999) describes that the literature on learning is beginning to focus on the quality of students’ learning experience and as such campus facilities are receiving greater attention in their ability to support and adapt to students’ learning objectives. Quality in the design of non-formal learning environments includes using materials and furnishings that provide comfort and are aesthetically appealing in order to attract and encourage students’ use (Riddle & Souter, 2012). Veitch and Arkkelin (1995) contribute that, “Good design, everyone agrees, is that which causes minimal human discomfort and maximum human functioning” (p. 316).

Therefore, the purpose of this chapter is to review the empirical research that informed this study’s questions in the design, perceptions, and usage of a university learning commons. The themes, design, implementation, user experience, and evaluation, were selected because of their transactional relationship in how they inform and influence each other. This literature review also identifies the gaps in research and highlights future areas of academic inquiry.
2.1. Chapter Organization

The literature review is comprised of five sections: learning environments, design, implementation, user experience, and evaluation. ‘Learning Environments’ describes and defines the terminology used and the theories in ecological, environmental, and social psychology as they relate to learning environment research. The second section on ‘Design: Learning Environments’ explains the literature on learning space design and the influence that technology and learning theory has had on its development. The third section on ‘Implementation: The Context’ defines the campus setting as composed of formal and non-formal learning space and provides a description of how these environments support and inform learning activities on campus. The following section on ‘User Experience: Environmental Features and Behavioural Outcomes’ describes the environmental features that have been identified in empirical research as influencing occupant behaviour. The final section on ‘Evaluation: Methods of Assessment’ provides a review of the methodologies that have been utilized in learning environment studies.

2.2. Learning Environments

Graetz (2006) poignantly states, “All learning takes place in a physical environment with quantifiable and perceptible physical characteristics” (p. 6.1). However, defining the learning environment and all that it entails has been widely challenged by the multiplicity in its interpretations (Bernard, 2012). Temple (2007) indicates that the learning environment has been defined by “the ways in which teaching and learning have been conceptualized or organised, rather than to physical arrangements” (p. 12). This is emphasized in Aldridge, Fraser, and Ntuli’s (2009) work referring to learning environments as “the tone, ambience, or atmosphere created by a teacher through the relationships developed in the classroom and the way in which instruction is delivered” (p. 148). Jamieson, Miglis, Holm, and Peacock (2007) describe the new generation of learning environments as where the “teaching and learning process is a mix of formal and informal learning experiences that take place in a range of built environments” (p. 18).
Similar to learning environments, the term ‘learning space’ has also experienced multiple interpretations. Savin-Baden (2007) describes learning spaces as transformative places that provide opportunities for the academic community to explore and bridge their thoughts and ideas (p. 8). The Joint Information Systems Committee (JISC) (2006) defines learning space as an environment able to “motivate learners and promote learning as an activity, support collaborative as well as formal practice” (p. 3). Brown and Long (2006) explain learning space as those settings used for learning activities that are designated outside the classroom. Johnson and Lomas (2005) also refer to learning spaces as the campus’s physical spaces that support learning activities.

The integration of technology in learning settings and the development of virtual learning environments have also influenced the definition of learning space. Jamieson (2000) differentiates these two settings by implying that virtual learning environments are learning ‘space’ and the physical environment is a learning ‘place.’ Goodyear (2008) concurs with this description and describes a learning place as providing “the immediate physical setting for someone’s learning activity, including the tools and artefacts, digital and material that come to hand” (p. 252). For the purposes of this study, the terms ‘learning environment,’ ‘learning place,’ and ‘learning space’ are used interchangeably and indicate “the complete physical, social, and pedagogical context in which learning is intended to occur” (Bernard, 2012, p. 12).

2.2.1. Theory: Environment, Behaviour, and Perception

Learning environment research developed from the foundational theory and research conducted in social, ecological, and environmental psychology. These disciplines have provided the formative frameworks on the relationship between people and their environment. Learning environment research has adapted and filtered these theoretical concepts through the unique lens of the university and the campus members that inhabit it (De Young, 1999; Graetz, 2006).

Social psychologist, Kurt Lewin (1936), spearheaded the study of topological psychology, described as the “attempt to comprehend human behaviour, in terms of the objects which are present, and of the relations among events taking place in a given environment” (Garrett, 1939, p. 517). Lewin’s Field Theory, as represented by $B=f(P,E)$,
is explained as “where behaviour (B) is a function of person (P) and environment (E) and the life space is the total psychological environment which the person experiences subjectively” (Kolb & Kolb, 2009, p. 47). Lewin’s work was seminal in that it identified the significance of the environment altering one’s behaviour. This framework also challenged the dominant psychoanalytic assumptions of the day.

Murray’s (1938) the Needs-Press Personology Theory explains the exchange between people’s personal needs, motives, or drive and the environmental factors (or press) that shape them. Murray’s theory suggests that our personalities are a result of behaviours influenced by series of primary (biological) and secondary (psychological) needs that we look to our environment to fulfill. Research in needs-press gave rise to the theory of person-environment fit that is described as the “alignment between characteristics of people and their environment resulting in positive outcomes for both individuals and organizations” (Sekiguchi, 2004, p. 177).

Stokols’ (1976) early work on human behaviour describes a conceptual framework that suggests humans interact with their environment in a series of modes that include orientation, operation, and evaluation. Orientation, as he describes, refers to an individual’s perceptions and her process of familiarization to her surroundings. The operation mode describes how she would then act upon her environment or is behaviourally influenced by her surroundings (Stokols, 1976, p. 352). The evaluative mode pertains to her assessment of the space in relation to her past behaviour and future goal attainment (Stokols, 1976, p. 353).

The environment also provides meaning and context through symbolic interactionism (Blumer, 1969; Strange & Banning, 2001). Symbolic interactionism involves the study of how people interpret and interact with symbols such as signs, gestures, objects, and words. This non-verbal communication is extremely powerful in that it influences physical direction, sense of inclusion, and institutional identity, values, and mission (Hatch & Cunliffe, 2006; Hewitt, 1993; Strange & Banning, 2001; Tinto, 2000). These symbols can take form in learning environments as institutional artefacts, artwork, and graffiti indicating to newcomers the culture, behavioural traces, and patterns of members within the campus environment (Strange & Banning, 2001).
Theories and models directly pertaining to the campus milieu began to surface in the literature during the late 1970s. Environmental psychologist, Rudolf Moos, applied the theories emanating from sociology and psychology to the academic setting in order to examine the influence of environment on student behaviour. Moos’s (1979) *Evaluating Educational Environments* identified non-formal learning settings, such as the campus residence, and compared them to formal settings, such as the classroom, to determine the factors that influenced student behaviour and perception. *Evaluating Educational Environments* became a seminal work for Dr. James Banning and his own literary contribution to the development and study of what he terms ‘campus ecology.’ Evolving from the disciplines of psychology and sociology, campus ecology is the study of the transactional relationship between campus inhabitants, campus environment, and the behavioural responses resulting from this interaction (Strange & Banning, 2001).

During this time, educational researchers began exploring issues such students’ perceptions, motivations, development, and learning outcomes in relation to the campus setting (Pascarella, 1985; Tinto, 1987; Weedman, 1989). Walberg, Haertel, Pascarella, Junker, and Boulanger (1981) and Astin’s (1984) theories on students’ educational productivity and involvement drew further attention to the influence and role of the campus environment. Walberg’s et al. (1981) Educational Productivity Theory correlates students’ productiveness and efficiency with their perception and experiences of the campus environment. Astin’s (1984) Theory of Involvement correlates students’ learning and development with their time spent on campus involved in learning related activities.

Strange and Banning (2001) synthesized the research and literature conducted on the campus environment in *Educating by Design*. This book has become an institutional resource for many campus planners, designers, and facility managers because of its comprehensive and interdisciplinary approach on learning space. The authors describe that the campus setting encompasses both physical and social components including the architectural design of buildings, landscape, structure of space, and activities that support or enhance socialization such as group work or extra-curriculum interests. They also suggest that student outcomes resulting from a positive interaction with environment include learning, networking, integration, and goal attainment.
The evolvement of learning environment theories has encouraged greater focus on the significance of the campus setting and its role in reinforcing and supporting the social and academic activities students engage in (Chickering & Reisser, 1993; Kuh et al., 2005). However, PEB theories are not as persuasive in the design of learning space. The next section addresses learning space design and discusses the contributors that have influenced its shape.

2.3. Design: Learning Environment

The design of learning environments has been primarily driven by new learning theories and technology (Boys, 2011; Brown, 2005). Paradigms have shifted from a teaching to student-centred model that emphasize active and collaborative learning. Active and collaborative learning, in part, places the responsibility of learning on the student who is expected to engage and explore with others in their learning process. Prior to these new concepts, the shape of space had supported learners as passive recipients of information. In addition, the impact of technology has mobilized learning tools, curriculum, and communication dramatically altering the perception that learning on campus only occurs in the classroom (Brown & Long, 2006).

In Brown’s (2005) “Learning Space Design Theory and Practice,” he explains that designers have interpreted learning theories and integrated technology into learning space to environmentally encourage students in adopting new behaviours. To encourage collaborative learning, the author suggests implementing small group workstations with virtual whiteboards and computer screen sharing. For active learning spaces, he describes implementing wireless Internet access and expanding the table’s work space in order to accommodate students’ learning tools.

Brown and Long (2006) convey three main principles one should follow when designing learning spaces. These principles consist of creating an environment that is human-centred, environmentally supportive of learning and instructional activities, and integrative of technology. The authors explain that technology and the mobility that it affords learners are driving factors in the design of space, as well as the shift from the
teaching paradigm to the learning paradigm. Their theory is that integrating these principles in space will encourage student participation and interaction.

Similarly, JISC (2006) describes technology, personal learning environments, and the mobility of learning as influential in the space design. They suggest future learning spaces be flexible, future-proofed, bold, creative, supportive, and enterprising. Long and Ehrmann (2005) similarly emphasize that the future of educational environments facilitate learning through supporting students’ activities and creating opportunities for learners to initiate and engage in communities of practice. The authors also recommend learning space be flexible, versatile, and provide areas for interaction between students and faculty. Technologically, Long and Ehrmann indicate that the portability of educational content and the ability to network and share information in real time will continue to be a driving force in the design of space.

The design principles of supporting and integrating technology, learning resources, and areas supportive of student collaboration have become increasingly prevalent in learning commons, student unions, and comparable buildings. To attract and encourage student use, facilities are implementing food services, student support services, computer labs, and group study rooms (Barber & Armacost, 2006; Davis & Shorey, 2006; Lombardi & Wall; 2006; Neame & Lomas, 2006; Potter & King, 2006). The zoning of learning space to provide users with a diversity of settings to choose from is reminiscent of Alexander’s (1977) “activity nodes” and their role in supporting the interaction and vitality of the community.

However, Cox (2011) and Jamieson (2009) express concern over multifunctional facilities and their ability to accommodate the many intents and agendas they serve. Research on the functional and behavioural aspects of these unique settings is limited (Cox, 2011). Jamieson (2003) and Hancock and Spicer (2011) also observe that the emphasis in facilities supportive of learning has dissipated and been replaced by motives to build spaces that are geared towards marketing and advertising the institution. Many have coined the learning commons as a “mall” or “one-stop-shop” for students’ learning needs (Nourjian, 2006). Buildings that encapsulate the “wow factor” to potential recruits are overriding campus plans and designs that promote learning and sustainability (Jamieson, 2003).
In Learning Spaces in Higher Education: Positive Outcomes by Design, Radcliffe, Wilson, Powell, and Tibbetts (2009) describe the multitude of design principles that the literature conveys. Drawing from several pieces on the design of space, they indicate that these principles are “difficult to apply in practice with a multi-disciplinary team of stakeholders in the creation of new learning spaces” (Radcliffe et al., 2009, p. 14). The authors also explain that the “style of pithy taglines is rather high-minded and universal and thus ambiguous; attractive to ‘big-picture’ thinkers but not so to stakeholders concerned about the specifics” (Radcliffe et al., 2009, p. 14). These issues, coupled with student demographic shifts, learning and pedagogical needs, and decreasing governmental funding for higher education, have contributed to the challenges campuses face when seeking guidance in the design of effective learning environments.

2.4. Implementation: The Context

Empirical research describing the process of implementing learning space is very limited (Blackmore et al., 2011). Blackmore et al. (2011) explain that the literature does not address how campus members “negotiate and create new relationships, organisational structures and process in the use of new learning spaces i.e. creating decision making structures and processes for ongoing ownership of change” (p. 12). The authors also identify that there is a “failure” to consider the transitions in the management of a new space that include dealing with “unexpected costs, dysfunctional spaces, and the mix of old, new, [and] temporary buildings” (Blackmore et al., 2011, p. 13).

Providing a framework to address the implementation of learning space, Johnson and Lomas (2005) suggest utilizing an engineering process referred to as CDIO: Conceive, Design, Implement, and Operate. The authors recommend beginning the method by appointing an internal institutional member as "champion" of the design and implementation process. The champion assists a committee of campus members in identifying contextual issues such as where the new space will be developed and determining the learning principles that will inform and structure this new environment. Johnson and Lomas then recommend defining the behavioural activities intended for the space. Once the new space is contextually and behaviourally defined, the team
establishes a series of requirements for the renovation and decides on the method in which they will assess the environment post-construction. The final step is to select and hire an architect.

As Johnson and Lomas (2005) describe, the implementation of a design requires understanding the context of the setting and identifying its learning principles. Research conducted in post-secondary learning environments describes the campus as comprised of both formal and non-formal space (Boys, 2011; Kolb & Kolb, 2005; Milne, 2006; Oswald & Hammons, 2008; Powell, 2002). Historically, greater attention has been invested in understanding how formal settings, e.g., classrooms, and their design, influence both learning and instruction (Baker, 2012).

Environmental researchers have learned that the classroom’s physical arrangement and structure can influence students’ academic and behavioural outcomes (MacAulay, 1990; Savage, 1999; Stewart & Evans, 1997; Walker, Colvin, & Ramsey, 1995; Walker & Walker, 1991; Weinstein, 1992). Marx, Fuhrer, and Hartig (2000) found that the classroom’s physical arrangement, such as seating, was influential in students’ interaction and engagement with classroom activities. In an effort to optimize student behaviour, Guardino and Fullerton (2010) suggest that the arrangement of classroom furniture helps define specific learning areas for direction. The authors also suggest that traffic patterns are clearly indicated and that learning materials are well organized, easily accessible, and available to students. These studies identify that design features convey to users a sense of purpose and behavioural expectation within a given space (Quinn, Osher, Warger, Hanley, Bader, Tate, & Hoffman, 2000).

Milne (2006) also describes the characteristics of non-formal learning environments including physical social spaces (i.e., lounges), physical transition spaces (i.e., hallways), physical small group workspaces (i.e., libraries), and physical private space (i.e., student residences). Exploration in other spaces is gaining momentum as research indicates that areas, such as the cafeteria, student residences, and library also influence and contribute to student enrolment, engagement, and satisfaction (Astin, 1984; Brown & Long, 2005; Kuh, 1995; Reynolds, 2007; Trutna, 2011).
2.4.1. Formal Learning Space

Johnson and Lomas (2005) describe formal learning spaces as areas that are “controlled via parameters such as scheduling requirements, set hours of use, set number of seats, and predetermined learning activity patterns such as lectures or discussions” (p. 16). These areas also include auditoriums, computer and science laboratories, performance rooms, and studios. Using Deleuze and Guattari’s (1987) spatial framework as a lens to interpret campus space, Savin-Baden (2008) describes formal space as striated: a controlled setting bounded by organization, course attendance, and the use of books (p. 13).

The design of formal learning environments is primarily influenced by the teaching paradigm and supportive of pedagogical activities such as instruction and delivery of content (Barr & Tagg, 1995). Directed and teacher-controlled, these performance-oriented settings tend to emphasize a linear thought process informed by the prescribed and time-tested tasks associated with rote and lecture-based learning.

2.4.2. Non-Formal Learning Space

Non-formal learning environments are explained as settings that are undesignated, unscheduled, and frequently accessible during most days and hours of the week (Acker & Miller, 2005; Diaz et al., 2010; Johnson & Lomas, 2005). The literature on non-formal learning space frequently refers to these environments as also informal. However, Eraut (2000) argues that “the term ‘informal’ is associated with so many other features of a situation – dress, discourse, behaviour, diminution of social differences, etc. - that its colloquial application as a descriptor of learning contexts may have little to do with learning per se’ (Eraut, 2000, p. 114).

Savin-Baden (2008) describes non-formal space as transient, flexible to learners’ needs, and often contested due to the disjunction experienced within the space. The author characterizes these environments as smooth and identifies their role as supporting critical dialogue and discourse that students engage in as they challenge and construct knowledge without “a given trajectory” (p. 13). She explains, “…instead, there is a sense of displacement of notions of time and place so that the learning space is not defined, but becomes defined by the creator of the space” (p. 13). These spaces are
normally defined as libraries, student unions, plazas, cafeterias, courtyards, student residences, and faculty offices (Johnson & Lomas, 2005).

The design of non-formal space is heavily influenced by the learning paradigm. Student-directed, these dynamic environments are spatiotemporally flexible, accommodating for a variety of activities supportive of autonomous, collaborative, conversational, and observational learning. Their versatility also provides a space for non-linear thinking, experimentation, risk, and self-assessment guided by the learner’s efforts to master the content.

2.4.3. Learning Space: Characteristics

The characteristics of formal and non-formal learning spaces are described in Table 1. This table defines and summarizes the differences between formal and non-formal learning space distinguishing the types of spaces considered formal and non-formal. Table 1 also addresses the institutional paradigm that these spaces are informed by, the thinking encouraged in each of these environments, the spatiotemporal dynamic that influences learning behaviour and activities, the type of learning supported in the environment, and the learner’s goal orientation as influenced by the type of space.
Table 1. Characteristics of Formal and Non-Formal Campus Space

<table>
<thead>
<tr>
<th></th>
<th>Formal</th>
<th>Non-Formal</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Described as a bounded, organized space dedicated to instruction and controlled via scheduling, set hours of use, class size, and predetermined learning activities.</td>
<td>Expressed as an open, accessible, and unrestricted space that is often contested due to its lack of scheduling and designation.</td>
<td>Acker &amp; Miller, 2005; Diaz et al., 2010; Johnson &amp; Lomas, 2005; Savin-Baden, 2008.</td>
</tr>
<tr>
<td>Type of spaces</td>
<td>Classrooms, Computer labs, Performance rooms, Science laboratories</td>
<td>Cafeteria, campus green, Learning commons, Student residences</td>
<td>Acker &amp; Miller, 2005; Johnson &amp; Lomas, 2005</td>
</tr>
<tr>
<td>Institutional paradigm</td>
<td>Instruction</td>
<td>Learning</td>
<td>Diaz et al., 2010; Johnson &amp; Lomas, 2005</td>
</tr>
<tr>
<td>Thinking encouraged</td>
<td>Linear</td>
<td>Non-linear</td>
<td>Herman Miller, 2005; Savin-Baden, 2008</td>
</tr>
<tr>
<td>Learning supported</td>
<td>Cooperative, Lecture-oriented, Rote</td>
<td>Autonomous, Collaborative, Conversational, Observational, Self-directed</td>
<td>Diaz et al., 2010; Savin-Baden, 2008</td>
</tr>
</tbody>
</table>

2.5. User Experience: Environmental Features and Behavioural Outcomes

Learning environment research describes the influence the campus’s physical features have on student perception and behaviour (Pascarella & Terenzini, 1980, 1991). Environmental features have been identified as characteristics that influence students’ perceptions regarding accessibility, comfort, inclusion, safety, communication, and concentration (Hunley & Schaller, 2006; Jamieson, 2003; Reynolds, 2007; Strange...
& Banning, 2001; Temple 2007). In reviewing the literature and empirical research, I have organized the physical characteristics of learning space as architectural variables, environmental factors, lighting, spatial characteristics, and spatial quality.

2.5.1. Architectural Variables

Architectural variables pertain to the structural characteristics of the space and its relationship to surrounding spaces. For the purposes of this study, the definition of architectural variables includes materials used in design of the space, distinct openings and enclosures, scale, transparency to surrounding space, and access to surrounding views and vistas. Research indicates that architectural variables and how they define space contribute to student engagement, collaboration, interaction, dialogue, and sense of safety (Atherton, 2009; Baker, 2012; Hillier & Hanson, 1984; Ittelson, Proshansky, Rivlin, & Winkel, 1974; Herman Miller, 2007; Strange & Banning, 2001).

Strange and Banning (2001) use the term “architectural determinism” in reference to how the design of the space determines the user’s behaviour. The facility’s design influences the circulation and intersection necessary to link people to one another (Hillier & Hanson, 1984; Ittelson et al., 1974). Accessibility to campus spaces and circulation of the overall environment is dependent on the symbolic clarity and signage communicated through structure (Strange & Banning, 2001). Architectural variables such as the access to views and vistas have also been found to reduce stress in workers (Chang & Chen, 2005).

2.5.2. Environmental Factors

Environmental factors include acoustic privacy, air quality, radiant temperature, and ventilation that affect the user’s experience in the space. Environmental characteristics influence students’ comfort, ability to concentrate, and overall health (Baker, 2012; Earthman & Lemasters, 2004; Murrain, 1983; Pizzo, 1981; Wargocki & Wyon, 2007). A study released by the Acoustical Society of America (2009) indicates that students’ speech intelligibility and academic performance declined when directly exposed to acoustic distractions. In addition, poor air ventilation in classrooms has been found to negatively affect students’ attendance and performance (Gordon, 2010).
Baker's (2012) study on the history of school design and indoor environmental standards documents, as early as 1910, that issues such as lighting, heating, and ventilation were concerns in school design. She reveals that the development of urban schools were focused on developing artificial means to ventilate and heat learning environments to create a more comfortable setting for students to learn in (Baker). Murrain (1983) surveyed 268 seventh-grade students regarding their temperature preferences and found that students’ performance was indicative of their thermal preference. The author’s research indicates that students exposed to extreme temperatures were compromised in their ability to learn; however, cooler environments were more detrimental than warmer rooms (Murrain). Temperature was also found to directly influence students’ speed in test-taking.

Veltri et al. (2006) assess how the classroom’s physical and functional aspects influence students’ perceptions of their learning environment through student interviews and wish drawings (drawings depicting the optimal classroom). Environmental factors identified through student interviews consisted of the classroom’s acoustics, temperature control, room/furniture flexibility, availability and use of technology, lighting, and setting. The students’ wish drawings also illustrated two themes that included having a clear vision of the instructor and other students, in addition to a flexible seating arrangement that offered maximum interaction between instructor and other students.

2.5.3. Lighting

Lighting is defined as the illumination provided within a space. Although considered an environmental factor, for the purposes of this study lighting was given its own category based on its significance and influence in one’s ability to engage in learning activities. Lighting is also symbolic in communicating to users the availability and accessibility of space.

Lighting includes features such as the access to natural and artificial light, the color of the lighting provided, and the control over intensity and task specificity. Lighting is reported as influencing activity, mobility, sense of safety, and mood (Addy, Wilson, Kirtland, Ainsworth, Sharpe, & Kimsey 2004; Baker, 2012; Dunn, Krimskey, Murray, & Quinn, 1985; Herman Miller, 2005; Phillips, 1997). Students’ exposure to light reveals,
“both natural (day) and artificial lighting have considerable effect on learner performance and that natural light optimizes student achievement and aesthetic perception” (Blackmore et al., 2011, p. 18).

Herzog (2007) analyzed a series of student variables, including second-year retention, average class start time, classroom windows, average class size, average classroom density, and average classroom size. Regression models were used to determine the impact of the classroom’s physical environment on GPA and retention. He concluded that students who took classes in rooms with windows accessible to daylight tended to average greater first-year GPA’s. The author also found that classrooms with access to natural light showed higher student retention. Herzog’s results further revealed that students’ GPA dropped as the size of classrooms increased.

Sleegers, Moolenaar, Galetzka, and van der Zanden (2011) found in their three Dutch studies on dynamic lighting that elementary students exposure to dynamic lighting features had positively influenced their ability to concentrate. The authors explain dynamic lighting as “lighting that provides different lighting settings, in specific combinations of illuminance and CCT, that can be applied over time to support both mental alertness and relaxation” (Sleegers et al., 2011, p. 3). This study also suggested that students’ alertness declined during autumn months indicating that seasonal changes in lighting influenced concentration. As a result, the authors suggested assessing the classroom’s artificial and natural daylight sources and describe using artificial lighting to compensate for the months where access to natural lighting is reduced by the seasonal change.

2.5.4. Spatial Characteristics

Spatial characteristics refer to the size and scale of space in relation to the user and their activity. This theme consists of circulation/movement patterns, size of space, spatial variability, spatial definition, layout, and spatial harmony. Spatial characteristics affect engagement, collaboration, interaction and dialogue (Acker & Miller, 2005; Brown & Knowles, 2007; Morphet 1972; Pappas, 1990; Qi & Chen, 2010; Sommer, 1978; Strange & Banning, 2001; Williams & Veomett, 2007). Hillier, Hanson, and Peponis (1987) describe that spatial layout “itself generates a field of probabilistic encounter, with
structural properties that vary with the syntax of the layout” (p. 233). Ittelson et al. (1974) elaborate:

All buildings imply at least some form of social activity stemming from both their intended function and the random encounters they may generate. The arrangement of partitions, rooms, doors, windows, and hallways serves to encourage or hinder communication and, to this extent, affects social interaction. (p. 358)

Strange and Banning (2001) refer to the opportunity and flexibility infused in the space as architectural possibilism. Possibilism allows for the user to modify the space for their activities. This includes the ability to modify the layout and arrangement of furniture to encourage group work and create greater student and instructor movement around the room. Pedagogically, the spatial flexibility offers faculty the structural support to employ a variety of methods for delivering their course material and reinforcing their course objectives (Strange & Banning, 2001).

For learners, the flexibility of their environment permits them to modify their surroundings to engage with each other and accommodate their learning preferences (Chism, 2006; Jamieson, 2003; Temple, 2007). Seating arrangement in classrooms, for example, may encourage or discourage dialogue by how students are positioned (Rath & Ittleson, 1981). Marx et al. (2000) found that a semi-circle configuration influenced student interaction and engagement with class instruction and content versus those in row and column seating arrangements. The flexibility and changes in furniture arrangement have also been found to stimulate curiosity and changes in student behaviour (Stokols & Altman, 1987).

Studies conducted by Hurley and Schaller (2006) and Moore and Piland (1994), measured the perceptions of students in campus learning environments. Hurley and Schaller undertook a four-year study evaluating undergraduate students’ use of campus learning spaces. Their findings revealed that students desired open design concepts with flexible furniture arrangements that could accommodate collaboration and engagement.

When assessing physical environments for adult learners, Moore and Piland (1994) found that mature students were attracted to environments that spatially
accommodated their impaired mobility and physical handicaps. The authors also emphasize that adult learners require clear and concise directions in navigating around facilities and preferred parking near the place of instruction. The studies by Moore and Piland (1994) and Hurley and Schaller (2006) indicate that students’ age may influence their need and reliance upon certain spatial features in order to support their learning objectives.

2.5.5. **Spatial Quality**

The term spatial quality describes the perceptions regarding how attractive, useful, or desirable users find the environment. This includes the aesthetics of the space, cleanliness, access to media/technology, organization, physical access to nearby space, ability to personalize the space, furniture and fabrics used in the space, and sensory richness. Research indicates that these characteristics have a positive affect on the duration of use (Burke & Burke-Samide, 2004; Daggett, Cobble, & Gertel, 2008; Maslow & Mintz, 1956; Sinofsky & Knirck, 1981; Stone, 2001). Reynolds (2007) surveyed 46 US and Canadian private and public post-secondary institutions on their environment and its physical characteristics. Results of Reynold’s study indicate that the condition of facilities and state of the campus’s physical environment influenced students’ decision to attend that institution, especially if they perceived the environment and facilities to be poorly kept and not maintained. Fisher’s (2000) literature review on the impact of school infrastructure on students’ behavioural outcomes found that school facilities ranked by teachers as being in better condition were shown to have higher student achievement scores.

In their U.S. national study, Campbell and Bigger (2008) surveyed 1,481 students regarding the cleanliness of their campus facilities and its relationship to student achievement. In their assessment of a building’s environmental factors, participants ranked in order noise, air temperature, lighting, and cleanliness as most influential in their learning process (Campbell & Bigger, 2008, p. 2). Eighty-eight percent of student respondents indicated that the lack of cleanliness in campus facilities was a distraction during their learning activities and 78% stated that a lack of cleanliness impacted their health (Campbell & Bigger, 2008, p. 30).
Aesthetics and beauty of the campus’s physical environment was a common thread shared by Douglas (1998), Harrington and Lindy (1998), and Harrington and Schibik (2003). Douglas, Harrington and Lindy, and Harrington and Schibik evaluated the perceptions and behaviours of first-year undergraduate students at university. Using a similar methodology identified as reflexive photography, Douglas assessed the impressions of first-year African-American students at a predominantly White university, and Harrington and Schibik gauged first-year undergraduates at a “mid-western” university. Though the studies address different student demographics, both indicated that the campus’s physical beauty and landscape were positively influential in students’ perceptions and experience on campus.

Abu-Ghazzeh (1999) concentrated on the perceptions of students, staff, and faculty who used the campus’s outdoor space at the University of Jordan. The collection of data revealed ten locations that students, staff, and faculty predominantly use. Abu-Ghazzeh assessed the behaviour of campus users in those ten locations and came to a conclusion that students were attracted to the university’s aesthetics. The external setting of the campus also provided areas in which students could socially gather and engage. This resulted in students feeling a greater sense of belonging on campus.

2.5.6. Summary

Learning space is comprised of architectural variables, environmental features, lighting, spatial quality, and spatial characteristics. In review, research conducted in architectural variables and spatial characteristics indicate that the boundaries, definition, size, and scale of both formal and non-formal space affect students’ ability to engage, collaborate, and effectively communicate with one another. However, environmental factors in non-formal learning space have not been thoroughly investigated though research indicates that poor ventilation, extreme temperatures, and poor air quality negatively influence student attendance and performance in the classroom.

The influence of lighting in non-formal learning environments has not been thoroughly researched; however, studies conducted in classroom lighting reveal that it influences users’ activity, mood, concentration, health, and sense of safety. Spatial quality, including the aesthetics, cleanliness, and overall appeal of the setting, has been
investigated in both formal and non-formal learning space and found to influence students’ perceptions, comfort, and duration of use.

Table 2 provides a summary of the design characteristics discussed in the literature and their behavioural influence on students’ perceptions and behaviour. This includes a brief definition and description of architectural variables, environmental factors, lighting, spatial characteristics, and spatial quality. Research indicates that these features influence the comfort, interaction, performance, and collaboration of students.

<table>
<thead>
<tr>
<th>Table 2. Design Characteristics and Behavioural Influence</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
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<tr>
<td><strong>Architectural variables</strong></td>
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<td><strong>Environmental factors</strong></td>
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<td><strong>Lighting</strong></td>
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<tr>
<td><strong>Spatial characteristics</strong></td>
</tr>
<tr>
<td><strong>Spatial quality</strong></td>
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</table>
2.6. Evaluation: Methods of Assessment

The literature describing the assessment of learning space design, its physical implementation, and subsequent usage is limited (Hunley & Schaller, 2006). Developing a standardized and accepted method has been difficult due to the challenges in identifying measurable variables coupled with the transient nature of the space and its occupants. Furthermore, institutions tend to rely on staff’s observation to determine and define the success of the space (Barber, 2006; Davis & Shorey, 2006; Lombardi & Wall, 2006; Neame & Lomas, 2006; Potter & King, 2006).

For formal learning spaces, variables identified often include learning outcomes, as demonstrated by grades, and students’ attendance and retention (Herzog, 2007). Student activities and person-environment interactions are variables frequently measured in non-formal learning space (Hurley & Schaller, 2006; Palomba & Banta, 1999). Although no formal evaluative process has been established within the discipline of education, qualitative, quantitative, mixed, and multiple methodologies have been exercised in assessing learning space. In this section, a review of the methodologies utilized to evaluate learning environments is addressed.

2.6.1. Qualitative Methods

Qualitative methods offer ways to explore in greater depth the perceptions, experiences, and behaviour of occupants and their space (Marshall & Rossman, 2011; Mayan, 2001; Neuman, 1997; Tinto, 2000). In the study of learning environments, interviews and focus groups are commonly used to understand the planning, design, and utilization of learning space. Other qualitative methods include observations, individual and place-centred activity mapping, document review, photography, and video. Casual and direct observations have been effective in assessing the activities and determining patterns between occupants’ behaviour and design (Applegate, 2009; Bell et al., 2001). Individual and place-centred activity mapping, as well as the use of geographic information systems tracking software, are also methods linking the contextual aspects of students’ activities and environmental features (Amedeo et al., 2009; Cosco, Moore, & Islam, 2010). Photography and video have been helpful instruments in documenting

Qualitative methods are limited in that they can be time consuming and require additional resources in order to gather and analyze content-rich data (Marshall & Rossman, 2011). The subjectivity of the data also raises concerns about its reliability and replicability (Neuman, 1997). Furthermore, the sample size of participants tends to be smaller due to the labour-intensive processes involved in gathering the data (Neuman, 1997).

2.6.2. Quantitative Methods

The use of surveys, questionnaires, and performance test instruments as methods of assessing students’ experience in learning environments has increased (Amedeo et al., 2009). Advantages in using surveys as a methodological approach include the capability to gather responses from a potentially large participant group; the ability to measure a variety of factors; and its relative affordability (Monette, Sullivan, & DeJong, 2005). Furthermore, the method can also serve as an instrument for repeated data collection in a longitudinal study. Quantitative methodologies are also perceived as providing increased objectivity in that they minimize interviewer bias by controlling the standardization of each question (Creswell, 2003).

However, quantitative methods frequently require that the researcher presuppose the topics, concerns, or issues, while establishing preset responses for participants, leading to a structural bias (Neuman, 1997). This significantly narrows the breadth and depth of the participant’s responses and restricts the inclusion of topics that may be of greater relevance in the participant’s mind (Monette et al., 2005). Furthermore, due to the popularity of online web survey software, questionnaires are often distributed in an environment that is not contextually relevant to the survey’s topic and may influence the participant’s response (Amedeo et al., 2009). This is of particular concern in learning environment studies that gather information on a specific space and ask detailed questions requiring the respondent to recall particular environmental features.
2.6.3. Mixed and Multiple Methods

Mixed and multiple methods have also been explored in current learning environment research (Bennett & Benton, 2001; Douglas, 1998; Harrington & Lindy, 1998; Harrington & Schibik, 2003; Hunley & Schaller, 2006). Mixed and multiple method studies use two or more instruments for data collection (Creswell, 2003). Mixed methods utilize techniques from both quantitative and qualitative research paradigms. Multiple methods research utilizes two or more qualitative techniques (Hoffman, 2009). In qualitative research, grounded theory, case studies, and ethnographic field studies often utilize multiple methods (Hoffman, 2009). The post-occupancy evaluation (POE) is one of the few multiple and mixed methods currently used to evaluate the dynamic between humans and their built environment (Zeisel, 2006). The POE is an evaluative process that stems from the building sciences and is growing in its popularity as a method used in identifying the strengths and weaknesses of a building’s design and function (Becker, 1989; Preiser, 2002).

As with any singular methodology used, there are concerns regarding the sampling, measurement, and procedural bias that may occur as a study is executed (De Lisle, 2011). Blending methodological approaches is useful in providing researchers the ability to triangulate data from multiple sources and assess for patterns and inconsistencies during analysis (De Lisle, 2011; Jick, 1979). However, there are several challenges in using multiple and mixed methods, including the time and resources necessary to conduct these types of investigations, the inability to fully understand each method used, and the complex process involved in integrating the data and offering a comprehensive summary of the results (Cameron, 2011; Creswell, Plano, & Garrett, 2008). Overall, the study of learning environments and the human dynamic within them is a multilevel phenomenon requiring a method that takes into account the complexity of this relationship (De Lisle, 2011).

2.7. Conclusion

The foundation of learning environment literature and its corresponding theories emanate from social and environmental psychology. These theoretical and conceptual
frameworks address the context of learning environments though fail to emphasize on unique characteristics of non-formal learning space. Classroom dynamics are considerably different, and understanding students’ perceptions, activities, and experiences in non-formal spaces may lead to new theories on learning behaviour. The theoretical literature also rarely defines or empirically tests the physical environment, placing much of the focus on an individual’s personality characteristics.

This review of the literature also identifies that the planning, implementation, and assessment of learning spaces has not been thoroughly investigated and therefore not well understood. Watt (2007) indicates that, “In both the management literature and the physical plant literature, little attention has been paid to how research facilities are used” (p. 6). She further emphasizes that no empirically tested metric is available for administration to determine how well campus members utilize the space allocated to them.

Blackmore et al. (2011) identify that there are several physical features of the built environment that factor into students’ achievement, performance, and learning outcomes. However, the authors cite that the studies conducted on the design, implementation, and evaluation of learning environments are limited and contain significant gaps such as failing to acknowledge the contextual uniqueness of the school’s setting (Blackmore et al., 2011, p. 8). Blackmore et al. point out that the design phase of learning space is primarily informed by the philosophical posturing of the group as opposed to empirical evidence. The authors also indicate that designers frequently fail to elicit users input as to their perceptions and use of the space.

As post-secondary institutions invest in the design and construction of educational facilities, consideration should be given to including students in the planning phase while evaluating how the setting will accommodate their present and future learning needs (Oblinger, 2006). The literature highlights that digital technology will continue to be a driving force in students’ acquisition of information and the design of learning space. Research suggests that building in an assessment process for these unique non-formal settings is essential in understanding how the environment is functioning and meeting students and administrators’ learning objectives.
3. Methodology

3.1. Introduction

Chapter 3 presents the methodology, that includes a comprehensive discussion of the research perspective, type, and methods employed during the study. This is followed by an explanation of the case campus, data collection methods, and the process undertaken to ensure data dependability and transferability. The chapter concludes with a detailed description of the data techniques used for analysis.

3.2. Research Question

This chapter presents the research methodology conducted at the Peter Jones Learning Commons (PJLC) at the University of the Fraser Valley (UFV), located in British Columbia, Canada. This exploratory study addresses the following questions:

1. What are administrators’ perceptions and observations of student learning in a non-formal learning context?
2. How do administrators implement their understanding of student learning into the planning, design, and operation of the PJLC?
3. How does the PJLC perform as a learning environment?
4. What are learners' perceptions, observations, and experience using the PJLC?
5. What are the patterns of student space usage in the PJLC?

The questions developed are intended to help identify the factors influencing the design of non-formal learning space, in addition to the environmental features that may influence student learning in non-formal learning space.
3.3. Chapter Organization

Chapter 3 begins with a review of the methodological approach and proceeds with a more in-depth examination of the post-occupancy evaluation (POE) as a methodology, the process of data collection, and techniques for data dependability, transferability, and analysis. The ‘Review of POE Methodological Approach’ and ‘POE Types’ discuss the methods used in learning environment research and narrow on the use of the POE, its methods, types, advantages, and limitations in assessing facility performance. The ‘Research Setting: PJLC’ offers a description of the PJLC facility and includes a brief historical backdrop as to how the building was originally conceived and its design evolution.

‘Data Collection Techniques’ provides an outline of the multiple methods undertaken for this study and describes the spaces that were observed in the PJLC. ‘Semi-Structured Interviews’ explains the methodology, the criteria used in selecting interview respondents, and the data collection process. ‘Direct Observations’ details the method and data collection process used to account for the usage of the space and construct a series of place-centred activity maps. ‘Place-Centred Activity Mapping’ describes the illustration of the structured observations. ‘Space Performance Evaluation and Photography’ explains the use of casual observations to inform the PJLC’s performance inventory process. ‘Archival Material and Other Sources’ provides a brief description for the additional content utilized during this study. ‘Data Trustworthiness’ and ‘Data Dependability and Transferability’ address the processes used to ensure the integrity of the data collected. Concluding the chapter, the ‘Data Analysis’ defines the process used to understand, integrate, and illustrate the data gathered.

3.4. Review of POE Methodological Approach

The POE is a systematic process of assessment that examines a building’s performance as defined by several factors, including meeting occupant expectations and satisfaction (Cole, Robinson, Brown, & O’Shea, 2008; Preiser, 1995; Zeisel, 2006; Zimring, Rashid, & Kampschroer, 2010). Often, the feedback obtained is used in the design, planning, and development of facilities as it provides insight as to how
inhabitants of the built environment perceive and behave within it (Preiser, 1995; Zeisel, 2006). Frequently, the literature also refers to the POE as a facility performance evaluation (FPE) or building performance evaluation (BPE) (FFC, 2001; Preiser, 1995; Zimring, Rashid, & Kampschroer, 2010).

A building science method, the POE was developed in the early 1960s as a way of determining occupants’ needs and satisfaction in subsidized housing (FFC, 2001). The use of POE then expanded to include additional facilities such as hospitals and prisons. By the 1980s, the POE was being applied to commercial buildings and offices. Now, and increasingly, the POE is being applied to the university campus as a way to better understand the relationship between students and facilities designed for learning (Ornstein, 2005).

The POE integrates multiple methods including surveys, observations, and interviews to assess the functioning of a building and inform stakeholders of the changes necessary to improve its intended use (Preiser, 1995; Zeisel, 2006; Zimring, 1987). The POE process is thus utilized to contribute ideas on future design and development as it concerns academic space and its intended occupants (Zeisel, 2006). Over the past forty years, this methodology has gained increased attention and further use in the campus environment as a method to better understand the use of campus space, and to provide valuable feedback to help inform the development of future learning environments (Li, Locke, Nair, & Bunting, 2005; Lippman, 2010; Spooner, 2008).

Due to the contextual nature of this study’s questions, I selected the POE because it is inclusive of users’ experience in the space and the physical variables that may influence an individual’s usage of the setting. The method also provided the optimal lens and framework allowing me to explore how the PJLC was environmentally evolving to support student learning. The use of POE also met additional criteria, such as: providing an assessment of the PJLC’s performance, including identifying strengths and weaknesses of its function and design; providing planners with data that can assist them in better meeting the needs of students utilizing the space; and contributing to the research in the design of learning commons.
3.5. POE Types

Cooper, Ahrentzen, and Hasselkus (1991) describe three different approaches to the POE – indicative, investigative, and diagnostic. The indicative review is a cursory assessment usually conducted over a period of few hours (Cooper et al., 1991; Preiser, 1995). The methodology generally consists of walkthrough and dissemination of a brief questionnaire to occupants. The purpose of this evaluation is to discover the prevalent strengths and weaknesses of the facility and to serve as a springboard for further research into the building (Blyth, Gilby, & Barlex, 2006; Preiser, 1995).

During this study I utilized the investigative POE. The focus of the investigative POE is to provide greater analysis and in-depth probing of the built environment. This methodology is significantly more complex requiring additional resources and multiple data gathering tools, including interviews, focus groups, and surveys to better understand the relationship between the space and occupant satisfaction (Blyth et al., 2006; Preiser, 1995). The assessment of the facility is undertaken over a 3 to 5 month period that results in a summarized report indicating suggestions and recommendations pertaining to the overall improvement and performance of the space (Cooper et al., 1991).

The diagnostic POE is a comprehensive analysis of the facility’s environmental and occupant system. Conducted over a period of 6 to 12 months, this evaluation also utilizes multiple methods, such as interviews and surveys to assess the function of the built environment (Cooper et al., 1991; Preiser, 1995). In addition, an environmental analysis is often conducted that involves taking measurements on the facility’s energy consumption, lighting, carbon dioxide emissions, acoustic performance, and HVAC system (Blyth et al., 2006; Cooper et al., 1991). The results of this report assist planners in evaluating the physical design, sustainability, efficiency, and occupant satisfaction (Cole et al., 2008; Preiser, 1995).

3.5.1. Advantages

POE is a method that assists designers, planners, and project administrators in gauging a facility’s function from both a human and environmental perspective (Meir,
Garb, Jiao, & Cicelsky, 2009; Ornstein, 2005; Watson & Thomson, 2005). Zeisel (2006) indicates that the POE can be extremely informative and instructive to designers and planners in that it also assesses the alignment of the designer’s decisions and objectives with the behavioural outcomes of the setting.

Organizations and institutions evaluating their space frequently use the POE as a diagnostic tool helping to identify both form and functional issues within a facility (Leaman, 2005). Addressing these problems may lead to solutions that will encourage greater use and satisfaction of its occupants (Zeisel, 2006). In addition, the findings from POE can lead to greater awareness of design intentions and performance implications, helping to inform design decision-making, as well as reducing ongoing costs leading to greater sustainability (Leaman, 2005; Preiser, 2005; Zeisel, 2006). This type of data also helps to inform design professions in developing new concepts, standards, and measurements within the practice (Preiser, 2002).

POE has also been shown to be an effective instrument in assessing the relationship between educational facilities and student behaviour (Cubukcu & Isitan, 2011; Spooner, 2008; Watson & Thomson, 2005; Zeisel, 2006). Although the methodology has not been widely used within the post-secondary context, examples of its use within these settings appear fruitful. Spooner (2008) assessed students’ use of the campus’s memorial outdoor garden with the POE and determined how the design of the environment influenced student study behaviour. Cubukcu and Isitan (2011) also used an extensive POE survey to determine students’ satisfaction with the environmental features and characteristics of their campus, in addition to how much time they spent on campus, their physical activity, and social engagement. Both studies indicate that the use of POE approach assisted in providing valuable information specific to how the built space and its design influenced student use and behaviour (Cubukcu & Isitan, 2011; Spooner, 2008). Meir et al. (2011) describe educational facilities as benefiting greatly from the use of POE in that it will help inform the process of designing and building schools while also addressing public accountability.
3.5.2. Limitations

Over the past decade, POE has been heavily criticized for its lack of standardization and formal process (Leaman, 2004). This is due, in large part, to the method having been adopted and adapted by several disciplines, including Architecture, Education, Environmental Psychology, and Resource Management and Environmental Studies. Data collection typically varies depending on the discipline, expertise of researcher, available research funding, and motives for conducting the review. In addition, each assessed environment is unique in its design, culture, uses, and intents, further complicating replication and generalizability of the findings. Furthermore, the integration of the data from both primary and secondary techniques can be difficult as well as synthesizing the findings of each unique approach into something collective, meaningful, and useful (Pati & Augenbroe, 2003).

The POE method is also limited by the historical documentation of the building’s design evolution. Facilities that have an extensive design plan correlated with an established behavioural performance program provide researchers with a greater understanding as to the intentions of the building (Zeisel, 2006). Buildings with a limited “written trace” as to their design intentions, or have no set behavioural objectives, hinder the researcher’s ability during the POE process to evaluate the purpose and meaning behind the design decisions (Zeisel, 2006).

In addition, the POE has not been widely utilized in practice. Architects, planners, and project managers are often not motivated to follow up with the facility and determine how it is functioning (Leaman, 2004; Meir et al., 2011). In many cases, there are no tangible incentives for institutions to complete such an evaluation, and the perception is that professional reputations may be tarnished if the findings reveal inefficiencies (Leaman, 2004; Meir et al., 2011). In addition, depending on the primary and secondary methods used, the POE can require considerable time to complete resulting in a prohibitively costly venture (Leaman, 2004).

Another disadvantage involves the reporting of POE findings. For many institutions, it is organizationally unclear who should receive the information regarding the building’s performance; furthermore, there are concerns about how that information will be used (Meir et al., 2011). In addition, organizations conducting POEs perceive the
data as potentially litigious, should the findings reveal serious flaws in the building’s
design and construction (Bordass & Leaman, 2004). This may result in the institution
withholding the findings of the POE to the broader campus community.

3.6. Research Setting: PJLC

3.6.1. Local Context and Historical Development

The University of the Fraser Valley’s (UFV) Abbotsford campus is located on a
64-acre parcel located in Abbotsford, British Columbia, Canada. Founded as Fraser
Valley College (FVC) in 1974, this two-year vocational school provided public access to
post-secondary vocational training in British Columbia’s Fraser Valley (Woodroff, 1983).
As a commuter college, it served adult learners through its Chilliwack campus, in
addition to holding classes in churches, restaurants, offices and basements throughout
the region (Woodroff, 1983). To accommodate the college’s growth and further provide
residents with access to post-secondary education, FVC built a second campus located
in the city of Abbotsford and continued its physical expansion from 1987 to 1997. FVC’s
Abbotsford campus constructed five new buildings during this time period, including the
one under investigation, the Peter Jones Learning Centre (PJLC). In 1991, the
government granted FVC university-college status and renamed the school University
College of the Fraser Valley (UCFV).

The formal designation of “university-college” and the addition of baccalaureate
programming altered not only the organizational mission and behavioural norms but also
introduced the staff, faculty, administration, and students to a new paradigm (Gaber,
2003; Henkel, 2002; Henkel, 2005; Jones, 1994; Levin, 2003). The direction of the
institution changed from a community focus to that of teaching and research excellence.
Internally, the UFV Administrators’ attitudes, behaviours, and values began adopting this
new mission (Stensaker, 2001; Stensaker & Norgard, 2005). Organizationally, UCFV
transitioned its structure, policies, and purpose in order to accommodate its additional
mandate and younger student demographic. Campus members interpreted the
university-college designation as a transitional step towards one day receiving full
university status (Jones, 1994; Levin, 2003; Levin, 2004).
From 2007 to 2009, the campus underwent another series of major renovations to lobby for full university status. Revitalizations to the PJLC were undertaken as well as the construction of new facilities such as Baker House student residence and the Envision Athletic Centre. The PJLC’s refurbishment included its name change to the Peter Jones Learning Commons. In 2008, UCFV attained full university status as the University of the Fraser Valley (UFV) serving local high school students and community members residing the region. Figure 1 provides a current contextual understanding of where the PJLC sits in relation to the other facilities on campus.

**Figure 1.** UFV Abbotsford Campus Map.

*Note.* Figure adapted from UFV Contact Us website, Retrieved on September 20, 2012, from http://www.ufv.ca/media/assets/Maps/3D+Campus+Map+Abby.pdf © University of the Fraser Valley 2012; used with permission.

### 3.6.2. UFV’s Campus Demographic

UFV’s Institutional Accountability Report Plan (2011) indicates that from 2010 to 2011, UFV consisted of 15,783 students with 83.7% registered as undergraduates. Of those students enrolled, 60% were female and 40% were male. Student’s average age was 24.1 years. Fifty-one percent (51%) of students attended UFV full-time and 43% of all students were enrolled in a bachelor’s degree program. Two-thirds of UFV students
reside locally in Abbotsford or its surrounding communities. In 2011, the institution employed a total of 710 faculty, 30 non-teaching faculty, and 689 staff including management.

3.6.3. PJLC: Development, Intentions, and Design

The facility selected for this single case study is the Peter Jones Learning Commons (PJLC) located at the University of the Fraser Valley (UFV) campus. Depicted in Figure 2, the PJLC was selected because of my prior research conducted on UFV’s campus environment as well as my existing knowledge of the historical evolution of the PJLC.

![Illustration](image_url)

*Figure 2. Peter Jones Learning Commons. Exterior view of west entrance.*


The PJLC is the largest facility dedicated to non-formal learning space at UFV. Conceived and built in 1995, the intention of the PJLC was to physically, culturally, and academically facilitate the institution’s paradigm shift from a two-year vocational college to a four-year university-college (P. Jones, personal communication, January 28, 2011). Although UFV had an existing library, there were concerns that the space could not physically accommodate the learning resources needed to serve baccalaureate students. This transition required the addition of infrastructure and space to support
educational and technological resources and to encourage self-directed and autonomous learning activities (P. Jones, personal communication, January 28, 2011).

James K. M. Cheng Architects Inc. designed the PJLC in 1994 (J. Smith, personal communication, January 18, 2011). James Cheng is a prominent Canadian architect who established himself in the early 1990s as a leader in condominium design and is credited with the architectural style known as Vancouverism (Cheng, 2011). Influenced by his mentor Arthur Erickson, architect of Simon Fraser University and the University of Lethbridge, James K. M. Cheng is also known for his use of concrete and glass facades in his buildings’ design (Cheng, 2011).

Figure 3.  
Peter Jones Learning Commons. Exterior view east entrance.


The PJLC is a concrete and brick constructed building consisting of two stories, with a convex outer wall, glass atrium, and a series of windowed walls allowing for natural light and access to surrounding views of Mount Baker (see Figure 3). The colour scheme used at the time of construction consisted of white, grays, taupe, rose and rosewood. The building measured 5,745 m² in size and the cost of construction amounted to $10.6 million dollars (J. Smith, personal communication, January 18, 2011).
Promoted as a ‘one-stop shop’ for students to access learning resources, the PJLC opened in October 1995 housing the college’s main Library, in addition to a series of student services including the Writing Centre, Math Centre, First Heritage Computer Access Centre, Staff Development Lab, two seminar rooms that also served as classrooms, and a satellite/teleconferencing room (J. Smith, personal communication, January 18, 2011). Over the course of its history, the PJLC has experienced a series of minor remodels to accommodate the changing needs of the institution. However, in 2007 administration and faculty collectively discussed avenues and ideas to better support teaching and learning within the PJLC thus encouraging the most significant renovation from 2007 to 2009 (Landolfi, 2007).

The PJLC had originally served as the primary place for autonomous, self-directed learning. In 2007, the PJLC’s Library and Rotunda were the only two non-formal learning spaces that students were able to study and collaborate in. The new initiative consisted of creating additional settings that encouraged greater student engagement throughout the PJLC. Administrators discussed how to generate greater interest in the facility and increase student utilization of the space.

In 2008, a series of renovations to the PJLC were undertaken and included the addition of a café, alterations to the library’s first floor to encourage group work, and reconfiguration of the Writing Centre layout and inclusion of an anteroom. The Rotunda’s study bar was further furnished with flexible seating and couches have been added to create a lounge area. Furthermore, the PJLC’s programming was modified to include two new services including the Assessment Centre and Teaching & Learning Centre. Additional services housed in the PJLC include the Library, Math Centre, Writing Centre, Instructional Media Services, and Envision Computer Lab.

Figures 4 and 5 illustrate the PJLC’s current space program that identify the administrative, retail, student services, and study space designated for use. Also indicated on the floor plans are the areas that were observed during the course of this study. These spaces are indicated visually through their bold outline in black and noted in the legend with an asterisk. Areas of these figures show certain notations made by Jacqueline Pizzuti-Ashby, author of this dissertation, in order to illustrate the zones observed in this study. These modifications do not represent the work of UFV, and the
author assumes full responsibility for their content. These images were modified in PowerPoint.

Figure 4. PJLC Main Floor Plan.

Note. Adapted from UFV Operations website, retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+1.pdf © University of the Fraser Valley 2012; used with permission.
Figure 5. **PJLC Second Floor Plan.**

*Note.* Adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+2.pdf © University of the Fraser Valley 2012; used with permission.
3.7. Data Collection Techniques

To gain a comprehensive perspective on the planning, design, and use of the PJLC, this study uses multiple data collection methods that include:

- Semi-structured interviews with administration and students
  - 10 total interviews
    - 5 with administration
    - 5 with students
- Direct observations
  - 85 total observational hours
    - 51 hours of casual observations
    - 34 hours of structured observations
- Place-centred activity mapping
  - 50 total activity maps were generated
    - 25 maps of the PJLC’s first floor
    - 25 maps of the PJLC’s second floor
- Space performance evaluation
  - 35 walk-through evaluations were conducted on PJLC’s technical, functional, behavioural features during the morning, afternoon, evening, and night
- Photography
  - 178 still images selected and analyzed

In addition, institutional archives were used to provide greater context to the planning and design of the PJLC. To understand both the complexity of students’ behaviour in non-formal learning space and administration’s design decisions, the use of multiple methods provided for the triangulation of data, which helped to establish the dependability and transferability of the information gathered.

3.7.1. Selection of Observation Areas

The areas selected for observation are internally located within the structure of the PJLC. These non-formal learning environments included spaces that were accessible and available to students and the general public during operational days and
hours. Spaces assigned as offices or as designated student services – such as the Writing Centre, Math Centre, Instructional Media Services, Envision Computer Laboratory, and Teaching & Learning Centre – were not observed. The exception is the Assessment Centre that was made available to students during specific evenings as a non-formal learning space. No observations were made of the PJLC’s external, outdoor features.

3.7.2. Semi-Structured Interviews

Within qualitative research, the interview method allows for researchers to probe into the meaning of the participant’s experience and gather in-depth information regarding a specific topic (Kvale, 1996; McNamara, 1999). In design, interviews can provide planners with information as to how occupants perceive and use their surrounding space. In general, there are three different types of interviews conducted in qualitative research: structured, semi-structured, and unstructured (Fontana & Frey, 2005). Structured or closed interviews are considered a quantitative instrument in that the responses generated are limited or indicated in advance for the interviewee to select (Wimmer & Dominick, 1997). The rigidity of the structured interview also permits the comparison of answers, given that the questions are close-ended. In contrast, the unstructured interview is far less formal with no questions or answers pre-determined (Minichiello, Aroni, Timewell, & Alexander, 1990). This provides the researcher with the freedom to explore a range of topics initiated by the conversation.

This study utilized a semi-structured interview that consisted of 12-17 closed and open-ended questions that facilitated the discussion (see Appendix A and B). This format provided a framework guiding the conversation, while also accommodating the flexibility to discuss topics in greater depth (Wimmer & Dominick, 1997). For the purposes of the POE, the semi-structured method of interviewing provided a vehicle for the administration to describe their perceptions and observations of how students learn and utilize non-formal space for their educational activities. This method also allowed for participants to explore and explain how their perceptions influence campus design and space planning. Furthermore, the semi-structured method of interviewing lends authority to the user’s experience, in this case students’ perceptions and observations in using the
PJLC, and offered the interviewer with additional insight regarding students’ impression and use of the facility.

Although the literature on the POE is not consistent in indicating a preference as to which type of interview should be used, three research articles suggested a structured interview for an indicative POE and a semi-structured format for investigative and diagnostic POEs (Ornstein, 2005; Watson & Thomson, 2005). Furthermore, POE research does not indicate a set standard as to the number of interviews that should be conducted (Ornstein, 2005). Preiser (1995) recommends interviews with key informants or conducting focus groups with occupants. To provide an industry example, Kooymans and Haylock (2006) POE study interviewed four participants who were managers of the facilities they investigated. However, the literature does indicate that a diverse selection of participants, including managers and occupants, is recommended and supports the quality of information and feedback retrieved on the design and function of the facility (Preiser, 1995; Ornstein, 2005).

Data Collection

For the purposes of this study, a total of ten semi-structured interviews of administrators and students were conducted at UFV during the winter term of 2011. As a former employee of UFV’s Institutional Research and Planning department, I was administratively familiar with the individuals that were influential in the planning and design of the PJLC. Academically, I was also aware of UFV students that had used the PJLC pre- and post-renovation. These students had transitioned to UFV staff over course of their studies.

Interview Questionnaire

The interview questionnaire provided to administrators (see Appendix A) was compiled from POE frameworks that provide a series of questions to ask facility designers, planners, and managers regarding the function and utilization intended for the space (Blyth et al., 2006; Council of Educational Facility Planners, 2007; Zeisel, 2006). The interview was also comprised of questions inquiring about administrators’ perceptions and observations of students’ behaviour in non-formal learning space. The additional questions asked included, “Do you feel that learning needs have changed for
today’s students? If so, how?” and “Based on your observations, how are students now using the Centre to engage in learning?”

The student questionnaire created (see Appendix B) was also informed by POE frameworks designed to elicit information on users’ experience, satisfaction, observations, and perceptions of the building’s performance (Federal Facilities Council, 2001; State Library of New South Wales, n.d.; Zeisel, 2006). The instrument included questions such as, “Based on your observations, how are students using the Centre to engage in learning?” “What specific design aspects to the Learning Centre do you feel best support learning?” “What do you think students value most about the Learning Centre?” These questions were developed to understand specifically how students perceive, observe, and experience the PJLC’s learning environment.

**Participant Recruitment**

All participants in the study were recruited by purposive sampling and selected based on their expertise in the planning, design, and usage of the PJLC. Tongco (2007) describes that “Purposive sampling, when used appropriately, is more efficient than random sampling in practical field circumstances because the random member of a community may not be as knowledgeable and observant as an expert informant” (p. 154). Furthermore, the POE method relies on expert opinion when attempting to understand the managerial design decisions and users’ experience post-renovation (Carthey, 2006). To ensure greater dependability in the information gathered, a total of 5 administrative and 5 student experts were chosen to interview.

Five administrators were purposively selected based on their expertise and experience in the planning and design of the PJLC. Their selection was based on these criteria: (a) a current or former employee of UFV, (b) influential and knowledgeable in the design process of the PJLC, and (c) willing to share information regarding their perceptions of student learning and the design process of the PJLC (see Appendix A for the questions that guided the administrative interviews).

Five students were also purposively selected to interview based on their expertise in using the PJLC pre- and post-renovation. The selection of these students was based on the following requisites: (a) experience using the PJLC as a non-formal
learning environment, (b) exposure to the PJLC pre- and post-renovations, (c) willingness to share information regarding their learning preferences and use of the PJLC (see Appendix B for the questions that guided the student interviews). The student participants were also employees of the institution, and four of the five worked directly in the PJLC. As students and staff, these participants offered both a depth and breadth of understanding as to how the PJLC functioned pre- and post-renovations. No new UFV students were recruited for the interview portion of this study as they lacked this vital knowledge of the PJLC’s refurbishment in 2008. However, the observations evaluating students’ use of the PJLC accounted for all new and existing members that utilized the facility.

**Interview Process**

All participants were contacted prior to the interview and asked if they would be willing to participate. Upon their agreement to participate, appointments were made arranging for a specific place and time to conduct the interview. At the beginning of the interview, participants were asked to sign an informed consent form agreeing to have their interviews recorded (see Appendix C). It was also at this time that participants were informed that they may review their transcript and make any subsequent changes. As author and researcher of this study, I personally conducted and recorded all the interviews which lasted approximately one hour. Each interview was preserved using a digital recording device. Participants were interviewed once and contacted via email if further clarification was needed. I also personally transcribed each interview to maintain the confidentiality of the participant and the content that they shared. All interviews were conducted and transcribed between February 1, 2011 and April 30, 2011.

UFV is a small post-secondary institution and revealing the participants’ job titles or specific scope of work would have identified them. Therefore, I’ve written a general description of their knowledge to help the reader distinguish each interviewee:

- **Administrator (A1):** is knowledgeable in space planning and utilization.
- **Administrator (A2):** is knowledgeable in the PJLC’s history of design.
- **Administrator (A3):** is knowledgeable in the PJLC’s recent renovations.
- **Administrator (A4):** is knowledgeable in the planning and design of the PJLC.
• **Administrator (A5):** is knowledgeable in the planning and design of the Library.

• **Student (S1):** Male part-time student who works and studies in the PJLC.

• **Student (S2):** Female part-time student who works and studies in the PJLC.

• **Student (S3):** Female part-time student who works and studies in the PJLC.

• **Student (S4):** Male full-time student who works and studies in the PJLC.

• **Student (S5):** Female part-time student who studies in the PJLC.

### Researcher’s Implication and Bias

Stated in this chapter’s ‘Participant Recruitment,’ I did know the interview participants and had worked with many of them during my employment. As a former UFV Research Analyst, I had also conducted studies and reports on the campus and this experience provided me with the knowledge about the inner workings of the environment and the influence specific campus members had on the design and planning of the PJLC.

To reduce researcher’s bias, a semi-structured interview format standardized the questions asked and assured that the same topics of interest and exploration were addressed in each interview. The pre-planning of the questions also supported greater dependability of participants’ responses. The questionnaire was reviewed by an independent party and consisted of both closed and open-ended questions offering participants the ability to expand on particular themes and supplement former responses. To assess the trustworthiness of the data, participants were informed that they may review their transcripts for accuracy. Following the completion of the study, I discussed my data interpretations and researching findings with two of the ten participants including one administrator and one student. The one hour dialogue with stakeholders contributed to the trustworthiness of the data and confirmability of the findings.

### 3.7.3. Observations: Casual and Structured

Used in field research, observational techniques gather information on people and their behaviour in their natural settings (Neuman, 1997). Within the social sciences, observations are generally categorized as casual or structured. Casual observations are
a qualitative process that involves the researcher watching others and gathering
descriptive information as to the dynamics between occupant and environment (Bell et
al., 2001). Casual observations often serve a vital role as they are frequently used to
inform and develop a behavioural coding system and template to support conducting
structured observations. Structured observations are quantitatively driven and involve
the systematic coding and recording of occupants’ behaviours (Bell et al., 2001). For
structured observations, a template is used and occupants’ activities are documented in
a given setting, indicating both a place and time in which the activity occurred.

In this study, casual observations were used to ascertain the general sense of
the activities conducted in the PJLC. During this period, I also evaluated the technical,
functional, and behavioural features of the space noting the physical environment,
design, layout of furniture, circulation, and any prominent environmental features that
influenced the use of the space (Sponser, 2008). Casual observations were then
followed up with a period of structured observations documenting and recording the
students’ activities.

The literature on the POE method frequently discusses the use of in-situ or direct
observations (Preiser, 2001; Vischer, 2001), but fails to recommend guidelines or
preferences as to how to conduct or record observations, the amount of hours
suggested to assess occupants’ behaviour, or how to analyze and illustrate the
observational data gathered. POE research indicates, however, that observational data
is key in evaluating the transactional relationship between design and end-user (Zeisel,
2006).

In their comprehensive paper evaluating the use of direct observations in school
settings, Nock and Kurtz (2005) identify several advantages in utilizing this methodology
as opposed to using a quantitative behavioural scale. These advantages include the
researcher’s ability to: account for and measure a wide range of behaviours without the
presupposition of a scale; examine and evaluate students’ behaviour within their natural
setting; have higher external and ecological validity by monitoring student behaviour in
its actual setting; and examine the sequences of events leading up to and following the
observed behaviour (Nock & Kurtz, 2005, p. 360). The author’s conclude that
observational methods are critical in understanding the behavioural dynamics of learning environments.

Disadvantages with this methodology include the time and cost involved in conducting observations; the observer’s training, expertise, and perceptual biases; human error in interpreting and coding behaviours; and the influence the observer’s presence may have on the student behaviour (Bell et al., 2001; Nock & Kurtz, 2005). During my observations, efforts were made to not disturb the students who were interacting and utilizing the space. A student myself, I dressed casually, interacted with staff, and utilized the services behaving as if I were a campus member.

Data Collection

The PJLC was observed casually and systematically for a total of 85 hours during UFV’s winter 2011 term, between the months of February and April. In order to gain a sense of how the space was functioning, the building and its occupants were casually observed for 51 hours, documenting the technical, functional, and behavioural aspects of the space. This documentation also informed the coding system that was developed in order to account for and classify the spaces and activities that students engaged in (Sommer & Sommer, 2002).

Data collected of the casual observations included noting, illustrating, and photographing the environment’s physical design and characteristics; technical features such as personal safety, structural finishes, ITS, ventilation; functional features such as ergonomics and anthropometrics; and behavioural features such as proxemics, privacy, and orientation. These observations were then organized in a template serving as a space performance evaluation further discussed in segment 3.7.5 of this chapter.

Fifteen non-formal learning spaces and ten student activities were identified. During analysis, the 15 non-formal spaces were collapsed to five zones based on their similarities in design, function, and intended use. The zones consisted of: the Clickz Café, Group Study Rooms, Rotunda and Writing Centre Anteroom (general open space), the Library’s first floor, and the Library’s second floor. Student activities coded within the space consisted of cell phone usage (texting or talking), consuming food or
beverages, listening to music, reading, researching, sleeping, socializing, studying, viewing videos, and waiting for friends or transportation.

Following the casual observation period, 34 hours were invested in systematically observing these spaces over a three-week period in April. One thousand nine hundred forty-three (1,943) students and their activities were documented during this time. Data collected during structured observations included:

- Activity type
- Students' location
- Day and time of activity
- Grouping preference
- Gender

This data was then entered into an Excel spreadsheet, analyzed, and graphed. In addition, PowerPoint was used to illustrate and document the data in a series of a place-centred activity maps.

3.7.4. Place-Centred Activity Mapping

The structured observations data gathered were graphed and illustrated as a series of place-centred activity maps. Place-centred activity mapping, also known as behavioural mapping, is a method that provides researchers with greater insight into how occupants behave within a particular time and place (Sommer & Sommer, 2001). This method of mapping is commonly employed in naturalistic settings, but has not been widely used within learning environment research.

Guided by timed intervals and a floor plan, the observer circulates through the area documenting the location and behaviour of occupants (Sommer & Sommer, 2001). This is referred to as “scan sampling” or an “observational sweep.” An observational sweep is a tally method where the observer counts an entire population at once and instantaneously records the behaviour of each individual during set time intervals (Leckie & Hopkins, 2002). The results of this method are frequently documented as a visual map that illustrates a temporal and spatial dimension of the data. One of the advantages of mapping is that it assists researchers in providing an additional lens to
view and interpret the relationships and patterns between human behaviour, physical design, and space (Bell et al., 2001; Neuman, 1997).

The disadvantage to observational methods, particularly with continuous observation, is that the observer’s presence will influence the occupant’s behaviour. However, observational sweeps are conducted quickly in order to collect data for place-centred activity mapping. The observer minimizes time spent in the space, thus reducing the risk of influencing the behaviours of those observed (Sommer & Sommer, 2002).

**Data Collection**

In the PJLC, activity mapping was conducted in the five zones – the Clickz Café, Group Study rooms, Rotunda and Writing Centre Anteroom, the Library’s first floor, the Library’s second floor – designated during the study. Floor plans of the PJLC were obtained prior to conducting the observations. The floor plans were modified to include the furniture and their placement within the setting. Data of behavioural activities mapped included:

- Activity type
- Students’ location
- Day and time of activity
- Grouping preference
- Gender

The coding system developed during the casual observation period was utilized for place-centred activity mapping. Using these codes, the PJLC was assessed each hour of the facility’s operation (7:00 a.m. – 11:30 p.m.) during each day of operation (Monday through Sunday). For example, students were observed and documented at 7:00 a.m. on Monday, 9:00 a.m. on Tuesday, 8:00 a.m. on Wednesday, 10:00 a.m. the following Thursday, etc. Data gathered was then illustrated as a place-centred activity map for further analysis (Sommer & Sommer, 2002). A total of 50 maps were generated that included 25 maps designated for each of the PJLC’s first and second floors.
3.7.5. **Space Performance Evaluation and Photography**

Conducting a walkthrough of the space is an essential part of the process in observing and documenting the technical, functional, and behavioural features of space (Blyth, Gilby, & Barlex, 2006). Secondary methods, such as a space performance evaluation and photography, further supplement the study by providing and recording details of the space and the environmental factors influencing student behaviour. To help guide the casual observations conducted, I adapted and integrated Blyth et al. (2006) and Spooner’s (2008) space evaluation template used in their post-occupancy evaluations to help inform the design of my own specific framework in addressing the PJLC’s unique multi-functional facility.

Photography, as a research method, emanated from anthropology and visual sociology, and is commonly used in ethnographic studies (Collier & Collier, 1986; Hockings, 2003). These studies utilize photography to supplement the documentation of the customs and cultures of people. In addition, the images are able to capture information and represent data in a more accessible form (Neuman, 1997). For this study, photography was used to accompany and support the space performance evaluation. Visual documentation of the space provided a record as to the design, layout, and physical traces of usage of the setting and supplemented the observational evaluation.

Photography has also become a powerful tool in design disciplines, including architecture and urban design, as it captures the physical development and use of space, in addition to informing future design and planning (Batty, Chapman, Evans, Haklay, Kueppers, Shiode, Smith, & Torrens, 2000). However, in learning environment research, photography is not a widely used methodology as there are often ethical concerns regarding the photographing of minors. The process of consent required by the guardian and/or institution is often a complex and lengthy process. If not carefully undertaken, this method may be interpreted by occupants as intrusive or suspicious, and thus influence their behaviour in terms of leaving the space or concealing their activities (Collier & Collier, 1986).
Data Collection

During each casual observation period, a performance evaluation was conducted to systematically review the technical, functional, and behavioural features of each designated space during the morning, noon, evening, and night (Blyth et al., 2006). Performing this inventory at different times of the day provided further insight regarding changes in occupants’ behaviour that altered the PJLC’s function. During the course of this study, a total of 35 observation evaluation sheets were completed and later summarized to provide one space performance evaluation for each specified zones (see Appendix D through I).

Using the performance template I had developed, I began my observations of each setting by illustrating the space and providing a brief description that defined and synopsised the area’s purpose, current activity, and the appropriateness of the space’s size in relation to the activity. In addition, the space’s surrounding surfaces and ambient features were also noted. Documentation of the floor and wall surfaces, ceiling, doors, windows, light quality, ventilation, air quality, information and communication technologies (ICT) provision, and furniture were also noted. Each feature was described and analyzed based on its material, suitability, durability, maintenance, security, control (manual/sensor), accessibility, and aesthetics.

Photography was also utilized to accompany the performance evaluation conducted. Photography provided the ability to capture the technical, functional, and behavioural features of the PJLC that included changes in: physical layout, lighting, furniture, and behaviour traces of the environment. The images used in this study do not contain content that represents the likeness or identity of any campus members. A total of 178 still images taken of the PJLC were logged in an Excel spreadsheet detailing:

- Photo identification number
- Date and time photo was taken
- Zone location
- Corresponding room
- Photo description
3.7.6. Archival Material and Other Sources

Additional sources, including publicly made available documents and reports, were also utilized as a reference during the study. These materials included institutional scans and academic planning reports. Furthermore, archival photographs of the PJLC were accessed through the photography website Flickr for review.

3.8. Data Trustworthiness

In the qualitative research paradigm, the trustworthiness of data is found in the data’s credibility, confirmability, dependability, and transferability (Golafshani, 2003; Shenton, 2004). Described by Shenton (2004), the credibility of data is determined by “ensuring that the study measures or tests what is intended” (p. 64). Lincoln and Guba (1985) suggest that the triangulation of methods is one strategy to determine data’s credibility. Triangulation involves the use of more than two methods to facilitate the cross-verification of data collected (Creswell & Miller, 2000). Data confirmability relies upon the researcher’s objectivity in the study which includes the instruments designed to gather data as well as the interpretation of the results and findings (Shenton, 2004). The following benchmarks were used to assure the credibility and confirmability of data gathered:

- Methods selected and used are appropriate for the featured type of data collection;
- Triangulation of data is possible as a result of the multiple methods employed;
- Repeated observations and multiple interviews on the environmental features and participant behaviour in the PJLC were conducted to establish accuracy;
- Environmental observations conducted in the PJLC are on the architectural, interior design, and aesthetic features of the space that are physically present for others to examine; and
- Observational, visual, and interview methods were collected as primary sources of data eliminating any prior interpretation or filter.
3.9. Data Dependability and Transferability

In the context of a qualitative paradigm, data dependability and transferability are key measures in determining the internal reliability and external validity of the study (Joppe, 2000; Lincoln & Guba, 1985; Shenton, 2004). Lincoln and Guba (1985) describe the dependability of qualitative data as based on two factors: the consistency of the product and the process that the data is obtained through. To determine the dependability of qualitative data, the researcher should account for and describe the environmental changes that occur during the execution of the study, and explain how these changes influenced the research approach (Lincoln & Guba, 1985).

The transferability of data pertains to “demonstrating that the results of the work at hand can be applied to wider population” (Shenton, 2004, p. 69). The data collected for this study is intended to highlight and identify the specific environmental features and participant behaviour unique to the physical milieu of the PJLC; therefore, the transferability of this data to other learning commons is limited in most respects. Dependability of the data gathered in this study was verified through the following measures:

- Environmental evaluation and direct observations conducted directly in the PJLC’s naturalistic setting, as opposed to through a secondary source such as video surveillance;
- Participant interviews provide a first-hand account on the perceptions and use of the PJLC’s learning environment;
- Multiple methods and triangulation were used in verifying the data collected;
- Photographs illustrate the environmental and in-situ observations conducted; and
- Several interview participants responded similarly to questions regarding their observations of campus members’ behaviour and use of the PJLC, in addition to identifying similar features pertaining to the PJLC’s design weaknesses and strengths.

3.10. Data Analysis Method

Following data collection, a qualitative analysis was conducted. The methods for analysis consist of:
• Transcribing, coding, conceptualizing, and categorizing the content derived from the semi-structured interviews with administration and students;

• Entering structured observations into an Excel database and graphing the results for further interpretation;

• Synthesizing the place-centred activity maps of each zone to illustrate patterns in usage, space, and behaviour;

• Aggregating the observation evaluations conducted on each space, and summarizing the results to create a building performance summary for each zone; and

• Analyzing the photographic documentation of the PJLC, and categorizing the content in an Excel spreadsheet to supplement the observation evaluations conducted.

The process of analysis indicated a series of patterns regarding usage, and identified strengths and weaknesses of the facility that were influential in supporting or detouring occupant use. The results of the study and their implications are examined in the following chapters.

3.11. Ethical Approval

The study was granted ethical approval from Simon Fraser University Office of Research Ethics and the University of the Fraser Valley Research Ethics Board. The study was categorized as minimal risk. Approval of the research addressed the protection of participants’ confidentiality in order to minimize any potential harm as a result of their involvement in the study.
4. **Results: Interviews**

4.1. **Introduction**

The purpose of chapter 4 is to present the analysis and findings of the interviews conducted to determine how UFV Administrators perceive and observe student learning in the context of non-formal learning space; and how they implement their understanding of student learning into the PJLC’s planning, design, and operation. Further, this chapter’s purpose is to describe learners’ perceptions, observations, and experience using the PJLC.

4.2. **Chapter Organization**

This chapter begins with the segment ‘Interviews: Data Analysis’ describing the data analysis procedures for the interviews conducted in the study. The chapter then proceeds with ‘Administrative Interviews’ and includes the results of the five interviews conducted with administrators influential in the PJLC’s design. This addresses the first question posed in the study: What are administrators’ perceptions and observations of student learning in a non-formal learning context? The interviews conducted provide further insight as to how administrators perceive and contextualize student learning in non-formal learning space.

The next segment pertains to the study’s second question: How do administrators implement their understanding of student learning into planning, design, and operation of the PJLC? The dialogue with administration describes the PJLC as a facility that has evolved in design to accommodate the institutional mission and changing expectations of learners.

The final section on ‘Student Interviews’ consists of the results of the five interviews conducted with UFV learners. This section addresses the study’s question:
What are learners' perceptions, observations, and experience using the PJLC? As both students and UFV staff, these participants offer a unique perspective regarding the renovations of the PJLC and how these changes have influenced their perceptions and use of the facility.

4.3. Interviews: Data Analysis

All interviews with participants occurred in their normal working environments. Each interview was digitally recorded, transcribed, unitized, coded, and synthesized under themes (Creswell, 2008). The interviews were semi-structured and guided by a questionnaire that directed the interview process and also served as a place to document and describe key points of the participant’s responses during our dialogue. Each interview was then transcribed by the author using Microsoft Word and supplemented by the field written notes taken.

This process of inductive analysis included a systematic reading of each interview in order to understand participants' perspectives, perceptions, observations, and experiences expressed. The analysis began by documenting key words and concepts in the margins of the transcripts. Key words and concepts were then categorized by labelling the text with a series of code words. The code words encapsulated the points or emphases of the participant’s interview and provided a coding frame (Thomas, 2003). Shamber (2000) refers to this procedure of categorizing or “unitizing” interview content as the process of assigning codes to a group of words that can then be fitted under a criterion category (p. 739). For the purposes of describing this analysis, I provide an example of this coding process here. For example, when administrators were asked “Do you feel that learning needs have changed for today’s students? If so, how?” An administrative participant responded:

That kind of multitasking that students do now, I don’t think you saw as much 22 years ago. So those students I was saying earlier, who are working on their own assignment or their own work, want to do it in the company of their friends. You know they will stop what they are doing and they will chat with their friends and they have their iPods and their ear buds in their ears listening to music. I think that it is much more common for students doing two or three different things at the same time while they are studying.
When broken down for analysis, the text segments of the quote above were assigned under three separate categories: Multitask-Oriented, Socially Driven, and Technologically Supported. The first text segment observing “That kind of multitasking that students do” was coded as “multitasking” and later assigned under the category “Multitask-Oriented.” The second text segment describing students’ learning “in the company of their friends” was coded as “company” and “friends” and later fitted under the category “Socially Driven.” The third text segment explaining students’ “chatting with friends” and their use of “iPods” contained three codes including “chatting” and “friends” that were categorized under “Socially Driven” and “digital devices” that was categorized under “Technologically Supported.” The fourth text segment explaining “students doing two or three different things at the same time while studying” was coded as “multitasking” and fitted under the category “Multitask-Oriented.”

The codes established in each interview were then verified and compared to one another. During the process of reviewing transcripts, a new code would often emerge. This new code would be added to the coding frame and each transcript would then be reread to confirm the new structure (Thomas, 2003). Once the codes were finalized, they were further reduced to a series of themes that encompassed the topics discussed by participants (Creswell, 2008, p. 251). Participants’ quotes that supported these categories were then highlighted for the drafting of the results.

A total of three themes were identified in the administrators’ interviews related to how they observed student learning in non-formal learning spaces and included: Technologically Supported, Socially Driven, and Multitask-Oriented. Five themes were established from administrators’ responses related to how they support student learning in the PJLC and included: Space Programming (subthemes: research and design decisions), Physical Design (subthemes: zoning of space and flexibility of space), Policies (subthemes: operational hours, consumption of food and beverages, and communication), Services, and Resources. Student interviews consisted of six themes that included: Pedagogical Influences, Physical Design (subthemes: lighting, distractions, and comfort), Services, Resources, Operational Features (subtheme: service hours and access), and Technological Resources.
4.4. Administrative Interviews

This first section of the chapter provides the results of the five interviews conducted with administrators influential in the design of the PJLC. This addresses the first question posed in the study: What are administrators’ perceptions and observations of student learning in a non-formal learning context? The analysis begins by describing administrators’ perceptions of student learning in non-formal learning space. The second section of the analysis addresses how administration implements their understanding of student learning into the PJLC’s planning, design, and operation of the PJLC.

4.4.1. Administrators’ Observations of Student Learning

Interviews with campus administration provide a more intimate understanding of the PJLC’s built intentions, design, and subsequent use over the past 15 years. As the institution’s paradigm shifted from a vocational college to a university, facilities were built to physically and symbolically represent this transition in the campus and to support a new pedagogy. Administrator (A2) described that when the PJLC was built, the intentions were to support a new learning paradigm and added, “Education was beginning to move away from the sage on the stage where you actually lecture to people to being what you call a guide on the side.”

Administrators were asked about their perceptions regarding how students’ learning needs had changed and their observations as to how students were now utilizing the PJLC. This included questions regarding students’ behavioural changes they had observed following the recent renovation. Administrators described that student learning in non-formal space had evolved into a very technologically interactive, social, and multitask-oriented process.

Technologically Supported

The theme Technologically Supported describes administrators’ observations and perceptions of learners increasing usage and reliance on digital devices, computers, and software in non-formal learning space. Several administrators expressed the advancements in technology’s portability and affordability have broadened the user
market. Administrator (A4) described this current generation of students as “digital natives” that “receive and digest information very differently” than former students. Administrator (A4) explained that students’ exposure to technology and the way information has been disseminated in this forum has influenced their “expectations” towards how professors organize their curriculum for learning. As he described, students expect that their learning experience will “all be laid out in a very organized way so that they can digest it and process it.” He also indicated that students increasingly rely on the university’s infrastructure to support their use of technology.

Administrator (A1) concurred and emphasized students’ “technological dependence” in learning environments. The reliance on technology, she described, is a result of study resources, learning materials, and assignments being transferred to an online forum. She explained that:

Access and being able to use those pieces of technology have to come into play because I think they are an important part of a student either studying or working on a paper. It’s just how things are done today. And that strides across all ages. It’s not just the young students who are turning around all those pieces of technology, it’s the mature students as well who need access to that type of space.

Administrator (A5) observed that students arrive to campus with their own technology and the expectations that the university’s infrastructure will support it. She indicated that the PJLC was one of the first buildings to acquire wireless connectivity to the Internet and that positively influenced students’ usage of the facility. Administrator (A5) illustrated that:

Students have their own technology. They’ve got their own iPods and iPhones. They’ve got their mobile devices and their laptops. And they really have the expectation that they are going to be able to be connected. So, I think that if we didn’t have wireless that might have an impact on how this building was used.

The PJLC’s support of technology in student learning has been paramount since the inception of the building. The PJLC housed one of the first dedicated computer labs on campus. According to Administrator (A2), he thought of technology as a bridge to offer UFV students and faculty access to a variety of learning sources including events and
lectures from other university campuses. He envisioned that the PJLC could be a place “where you could put on these events from other parts of the province then people could watch very casually and use these modules in a course.” The continuation of supporting technology and its use in the building continues. When converting the PJLC’s Rotunda to student space equipped with seating and a study bar, Administrator (A3) described administration’s thought process at the time as follows, “It gave students a place where they could hang out and study” in addition to providing “computer access and data ports.” Students, as they witnessed, gravitated to areas where technology was best supported.

Socially Driven

The theme Socially Driven encompasses administrators’ perceptions and observations that students prefer to engage and learn with and around others. In this collaborative process, skills, habits, and the institutional culture of learning are disseminated. In addition to their frequent use of technology, Administrator (A5) discussed how traditional students, those entering university straight from high school, have been observed as “needing to be with their friends” and that spaces in the PJLC are instrumental in supporting socialization, companionship, and collaboration during the learning process. Administrator (A3) responded similarly regarding her observation of students learning in a more collaborative atmosphere. She stated, “Our students tend to be very social and they like to work either close by or interacting with others.”

Administrator (A3) indicated that shifts in primary and secondary education have influenced today’s university students in wanting to learn collaboratively as opposed to individually. Over the years, she has witnessed students spending more time on campus with very few areas, outside the classroom, for them to sit, study, and “engage” with others. In response, one of her objectives was to create additional non-formal lounging areas to provide students a “comfortable” place to interact with campus members.

Student learning has also been heavily influenced by paradigm shift from teaching centred to learning centred. Administrator (A2) highlighted the independence that students needed to explore learning with each other and role that physical space has in supporting this discovery process. Administrator (A2) explained the need for UFV
facilities to promote “autonomous learning” through spaces that facilitate collaboration and encourage research and self-directed learning activities. “Learning,” he observed, “can come through conversation” and “happens everywhere.”

Administrator (A1) illustrated that current research on student learning indicates that it is a social process best reinforced through one-on-one contact. As a result, she described the efforts UFV has made to implement new student learning programs that provide peer mentoring and supported learning groups. However, she noted that these types of learning engaged programs require spaces on campus to support collaborative learning activities. Administrator (A4) also highlighted the supported learning groups initiative as an opportunity for students to “lead students” and to encourage learning through the relationships forged. In addition, he also indicated that campus space “has a role” in supporting these programs.

Administrator (A4) emphasized the use of the PJLC’s environment to engage students in conversation and learning. Following the recent addition of the Clickz Café and renovations to Rotunda, he commented that he has noticed more students studying, socializing, and involved in group study activities. He observed that creating spaces that are supportive of conversation result in students spending more time on campus. Administrator (A4) illustrated that, “The more [students] want to be on campus, the more they want to engage with each other, with the profs, with the information, the more they are going to learn.”

Multitask-Oriented

The theme Multitask-Oriented addresses the diversity of activities that administrators observed students engaged in while utilizing non-formal learning space. Administrators explained that while they observed students studying, they also noted that they were involved in juggling other activities such as listening to music, eating, and interrupted to chat with friends. Administrator (A5) described that socializing, coupled with the use of technology, creates a variety of distractions for young students. Student learning today is fraught with multitasking and she explains, “I think that it’s much more common for students doing two or three different things at the same time while they are studying.” Administrator (5) cited studying, socializing, listening to music, and eating as just a few of the myriad of activities she observed students frequently engaged in. She
indicated that providing non-formal learning environments that are supportive of multitasking are essential in that students “are used to being able to do it all at the same time at the coffee shops, bookstores” and expect campuses to understand that multitasking “is part of the package” in today’s student learning.

Administrator (A1) observed students studying in the Clickz Café, “with their headphones and iPods and laptops.” She described students as also spending more time on campus and as a result looking for spaces that support a variety of activities during this extended time between classes. Administrator (A1) emphasized that the “messaging” administration receives from this new generation of student is that “they multitask and they want the radio, the T.V., and everything going on all at once.”

Administrator (A4) indicated that designing and planning a space that supports student involvement in a variety of activities has been challenging. In addition, Administrator (A4) indicated that students' expectations of non-formal learning space have increased and with that the pressures of the campus to meet them. One of the challenges he expressed is defining student activities and evaluating what kind of physical infrastructure they entail. Administrator (A3) discussed that she has noticed an increase in students engaged in a multitude of activities within the PJLC. As a current student, she indicated that multitasking behaviour is not necessarily specific to non-formal learning environments, “I am always amazed when I see it in the classroom. It kind of frustrates me but I'm old school. Students can do that but I can’t.”

**Summary**

As described, administrators interviewed observe students entering non-formal space with a diversity of technological and social needs, in addition to personal preferences, that are often dependent upon the activities that they are engaged in and the peers that they are with. Administrators describe that students arrive to non-formal learning environments with “expectations” that the space will accommodate their personal and learning needs similar to their learning environments at home. Furthermore, administrators interviewed indicate that the prevalence of technology in learning is influencing student’s interaction with information and increasing demands of the university’s infrastructure, resources, and services to support their use of digital media.
4.4.2. Administrators Implementation of Student Learning into the PJLC

This section pertains to the study's second question on how administrators implemented their understanding of student learning in the design, planning, and operation of the PJLC. The interview content with administrators described how UFV has worked to support the learning needs of students through the PJLC’s space programming, physical design, policies governing the space, as well as through the services rendered and resources provided. Re-designing the PJLC to more effectively reinforce learning activities, human relationships, and information sharing has been a challenge given the multi-functionality of space and the variety of stakeholders involved. Given this complexity, administrators interviewed indicated that there were no formal learning objectives written in the planning and design of the space but there was a vision as to how the space would perform. Although no formal evaluation was conducted to determine how the PJLC has since functioned, based on their observations, the renovation of the PJLC has been successful in attracting and retaining students.

4.4.3. Space Programming

Within the context of post-secondary education, space programming entails both research and decision-making processes in the design of space. Research offers administration a better understanding of occupants’ needs and requirements. This leads to informed decisions that can then be made as to the size, type, and interior design of the space, as well as the equipment necessary to support the intended activities.

Research and Design Decisions

In understanding occupants’ needs, administrators interviewed stated that they have primarily used their observations in determining how students utilize the PJLC space in order to assess the efficacy of the design and make further design decisions. According to Administrator (A5), the PJLC and its services have established observable patterns in terms of use and demand. As she described, there are busy times and quiet times during each semester where administration notes how the space is being utilized during these cycles. Administrator (A5) determined the success of the space by the student feedback she receives and observing student use. She noted, “The acid test is,
are students using it? And then other things are am I getting complaints? Am I getting requests? That kind of thing. But you know for me students really vote with their feet.”

A frequent visitor of the library, Administrator (A1) described assessing the space and observing patterns in proxemics and student use of the study carrels. She illustrated that:

Students have a pattern. I think I could see that when the first student would take a pod of four [study carrels] all to themselves. Then as it got busier someone would go kitty corner to them on the opposite side. Then if it got really busy they would take the position right beside somebody else but the preference wouldn’t actually be to sit shoulder to shoulder. You can tell that that’s only a last resort kind of thing. You see those patterns.

She also mentioned that administration had anticipated removing all the study carrels on the second floor and renovating the area to accommodate for more group space; however, the final decision resulted in keeping the environment reserved for quiet study. As she conveyed, the study carrels are well utilized, indicating “there’s demand [for] that type of quiet study on this campus.” Administrator (A4) also monitored students’ behavioural patterns in the planning and design of space. He indicated that his observations have influenced design decisions regarding how to best furnish the PJLC and has also used design to direct student behaviour:

We had discussions and we wanted soft seating and tables again for that flexibility so that some can sit alone. I’ve noticed and observed students that sit on the soft seating along the wall often have their laptop here and [are] working. They have their music plugged in and they’re working alone. Right? And they need that. To shove a table in front of them…I don’t know if they would feel comfortable [because] it’s almost like inviting other people to join them. We intentionally had a single format but also there [are], across that space, tables so that you can have a mix of single and groups going on at the same time and together they kind of give the space life.

Administrator (A3) often examined where students tended to congregate and observed how students were physically supported in the space. Providing an example, she explained that if she witnessed students frequently sitting on the floor in a particular area, she’d suggest providing furniture in that space to support student use. Administrator (A3) also expressed that she is, “always looking at space” as an
opportunity to accommodate students’ needs for comfort especially in “unexpected student-like public spaces.”

Building on features that are observed as supporting student learning and maintaining a consistent vision of the PJLC’s intent have been instrumental in informing and guiding the facility’s development. Heavily involved in the initial planning and design of the PJLC and other UFV facilities, Administrator (A2) commented how his observations in the utilization of student nooks influenced the continuation of this design feature in future facilities:

One of the interesting things about the architecture of the college, as it was originally built, was that it was deliberately built with spaces for people to sit and talk. I don’t know if you ever noticed that, but there are little nooks and I couldn’t help but observe that they were always being well used. I’m not sure that students were always talking about education but nevertheless it really provided an atmosphere that you didn’t find in top-level colleges around the province. And it was something you needed to build on.

Aside from observations, research reports have also helped to inform campus administration about how users are interpreting and using the PJLC. Four of the five Administrators interviewed cited the Campus Snapshot: A qualitative study on the perceptions of students at the University College of the Fraser Valley as influential in the space programming of the PJLC. Pizzuti-Ashby and Alary (2007) conducted a qualitative study that provided UFV senior administration insight as to how students perceived the campus milieu. Using reflexive photography, students were asked to journal and photograph spaces that they liked, didn’t like, and that reinforced the identity of the school. Following the study, student participants met with senior administration to discuss their ideas about the campus’s physical space and suggested improvements and solutions that helped inform the PJLC’s future renovations.

There have been challenges in maintaining a shared vision for the PJLC. Aligning students’ needs, the physical design, and the services provided has brought together several users with different concerns and intentions that conflict in how the space should be programmed. Administrator (A1) explained that the PJLC’s gain in student popularity and accessible location has resulted in administration redesigning the
space to attract prospective and first-year students. She recognized that sometimes a student’s first experience on the UFV campus is visiting the PJLC. Administrator (A1) also indicated that moving the Assessment Centre into the PJLC was a strategy by administration to make a positive first impression with new students. She described that administration’s thoughts were, “Well that would be a great space for students to come and write their exam to hopefully get a sense of that space.” However, she commented that the staff in the Assessment Centre might have felt differently about the move even though administration was attempting to keep the PJLC and its services “more in line with the Learning Centre objective.”

Shifts in objectives and in the allocation of space are just a couple of the challenges administrators discussed. Administrator (A4) described that the process of changing space is complex and involves meeting British Columbia’s Ministry of Advanced Education College and University space standards while accommodating the needs of a diversified student clientele, and fulfilling the expectations of staff, faculty, and administration. Emphasizing the tug-of-war that can occur when space is reprogrammed, Administrator (A4) explained:

There’s always a negotiating going on there, [because] whenever you give users the opportunity to move they want more [space]. It’s always the bottom line. You [have got to] hold the line and try to keep them to Ministry Standards. There’s always a negotiation that happens. Doesn’t matter who you are dealing with.

4.4.4. Physical Design

The physical design of the PJLC has transitioned over the years to accommodate the changing needs in student learning, technology, and to align the services fundamental in supporting its learning objectives. Zoning space for learning activities and providing a flexible environment were two subthemes of the physical design of the PJLC addressed by the administrators interviewed.

Zoning Space

Administrators described that zoning the PJLC has been an effective design strategy that provides student access to a variety of unique spaces in one facility. The recent renovation included implementing new and reinforcing existing learning settings.
that encouraged individual silent study, group study allowing for normal conversation volume, and group study permitting quiet socialization. They also created lounge areas flexible to individual and collaborative activities, in addition to spaces permitting the consumption of food and beverages. Student and faculty services are also available in the PJLC.

Administrator (A5) explained that her visitation of libraries and learning commons, in addition to her discussions with their corresponding administrators, have provided her with additional insight as to the “thoughtful” planning and design of these unique environments. She also recognized that the zoning of space in these non-formal learning environments is essential in order to offer students a variety of learning spaces to suit their changing preferences and needs. Administrator (A5) also observed that the zoning of the PJLC has made a very positive impact on student usage of the facility.

Administrators interviewed attribute the increase in the PJLC’s usage to the variety of spaces and activities supported in the facility. As a result, many stated that they have noted an increase in volume of students utilizing the space for studying and socializing. Administrator (A4) explained that they didn’t anticipate the dramatic increase in campus members’ use of the facility that has resulted in an increase in foot traffic and noise volume. Subsequently, a few follow-up renovations were made to further insulate quiet study spaces and student services from the socializing in the hallways and café. As Administrator (A4) commented:

We had some post-project changes. We had contemplated them in the project but didn’t know to what level we would need them so we waited until the project was done. We wanted to protect the second floor of the library [because] that’s the quietest space on campus and it’s right next to a speaker. The Rotunda is one big loud speaker and noise gets in there and it just reverberates and goes right upstairs.

Flexibility of Space

Administrators often referred to the importance of flexibility needed in non-formal learning environments. They commented that a flexible environment is one that can be tailored by users to support their physical and academic preferences and needs. These preferences include the ability to arrange the furniture to accommodate materials or
other people, adjust lighting intensity, consume food or beverages, socialize with others, use technology, and access the space at different hours of the day. Administrator (A5) described that today’s students “are used to being able to do it all at the same time at the coffee shops, bookstores” and “they see it as part of the package of multitasking.” As Administrator (A4) observed:

First and foremost [the space] has to be flexible because that means something different to every student. So I could tell you what my concept of it is. Generally, it looks to me like it has soft seating. It’s flexible and you can move it around. It can be private. It can be group. It has all the technology. It’s equipped for technology. It has lots of plugs for laptops. It’s wireless.

Administrator (A1) discussed that flexibility was key in student learning space but interpreted the design of the PJLC’s student spaces as primarily fixed as opposed to flexible. She indicated that the furniture in the PJLC’s zones was either bolted down or too heavy to adjust and that “[students] are utilizing that space as it is dictated to them.” She thought that students’ ability to rearrange the space would increase the demand of these learning environments. However, Administrator (A1) also stated that, “there’s a balance in figuring out the spaces” level of flexibility citing that furniture often goes missing from more mobile settings. She expressed that providing students with a mixture of both fixed and flexible furniture layouts is important to accommodate students’ learning needs.

4.4.5. Policies

There have been a series of instrumental policy changes regarding the operational hours of the PJLC’s services, the consumption of food and beverages, and communication specifically pertaining to the volume of socializing and cell phone usage that have influenced users’ access and behaviour in the PJLC’s setting. Signage has been used as the primary means to convey new policies that indicate to PJLC users how the space is intended for use. Services, such as the Library, Assessment Centre, Math Centre, and Envision Computer Lab predominantly use signage in and around their locations to indicate behaviours permitted in or around their space.
Operational Hours

Administrators indicated that the PJLC’s hours of operation have been extended over the years to accommodate employed and part-time students. Upon the PJLC’s initial opening, the building’s accessibility aligned with the library’s operation hours which were Monday through Thursday 8:30 a.m. to 9:00 p.m., Friday 8:30 a.m. to 4:30 p.m., and Saturday 10:00 a.m. to 4:00 p.m. Since then, the hours of the PJLC have extended to Monday through Sunday, 7:00 a.m. to 11:30 p.m. In response, the library and computer lab extended their hours of services from Monday through Thursday from 8:00 a.m. to 10:00 p.m., Friday from 10:00 a.m. to 6:00 p.m., and Sunday from 12:00 p.m. to 6:00 p.m. With campus members using the space for longer periods of time, demands for food and beverages increased and the Clickz Café responded by increasing their hours of operation during the semester. However, the operational hours of the PJLC and student services such as Writing Centre, Math Centre, Clickz Café, Envision Computer Lab, and library do not correspond raising confusion as to what services are accessible and when they are available.

Administrators interviewed also cite that operational hours have also been influenced by the recently constructed residence on campus. The inclusion of a student residence has brought a new demographic of students who now live and depend upon the university premises. Administrator (A3) stated that the PJLC’s change in operational hours has been to support these residents with an additional learning space during the evenings and weekends.

Consuming Food and Beverages

Since the addition of a café, policies regarding the consumption of food and beverages have relaxed. The majority of the PJLC space now accommodates for the consumption of food and beverages. The computer lab is the only exception. The library, which had restricted the consumption of food and beverages, now allows for beverages to be brought in with a covered lid. Administrator (A5) clarifies that although food consumption is still not permitted in the library, staff are aware that it occurs and tend to not enforce the policy.
Food and beverages in the library have been a contested topic for staff. Administrator (A5) explained that library staff have been reluctant to allow beverage consumption in covered containers until recently. She highlighted that the recent change in policy has been due to a variety of reasons including that this new generation of students is “much less likely to comply with the no food, no drink” restrictions. Though the new policy restricts the consumption of food, she stated that:

We allow pretty much everything in a container. And that is just to keep fluids to a minimum. In theory, people aren't supposed to be eating in a library but frankly I don’t enforce that. And we have seen a lot of people snacking in the carrels.

The change in policy is also a result of the recently added Clickz Café. Students are observed often entering the library with food from the café. Administrator (A5) indicated that the consumption of food and beverages in the library also requires additional maintenance in regards to emptying trash receptacles and cleaning furniture. She described that staff have considered providing more trash receptacles in the space to encourage students to clean up after themselves:

Some people have said if you make [food consumption] allowed, and open, and provide enough garbage receptacles, then you might actually cut down on the need for clean up because students will clean up after themselves rather then hide the fact that they are eating there. They'll actually be more open about it. So for me, and I think most of the library staff, the issue is not the food. It is the mess that tends to get left behind.

Administrator (A4) highlighted that in conjunction with the recent renovations, relaxing policies about food and beverage consumption and socializing were important in bringing a “student buzz” to the PJLC. As he described, “Administration has opened up drinking coffee in the library and on the lower floor. So these kinds of things all give students other forms of informal and formal study places to take their coffee.” He also stated that providing areas that allowed for socialization, activity, and the consumption of food and beverages were important in attracting students to the space and encouraging them to stay in the space. Administrator (A4) explained:

Our vision for the whole lower floor re-modeling was to bring more student buzz, to have more student study space, have that interaction of retail and students together. And I think the enormous demand and
interest in the [café] probably supersedes any kind of seat taking issues of students hanging around [because] they still come in droves to buy the product and they just take it elsewhere.

Communication

One of the challenges indicated by administrators interviewed was the fine line between encouraging greater activity and communication between students and maintaining a focused and productive area for learning. To promote greater group collaboration, administration opted to convert the first floor of library from individual study carrels to group study tables. In addition, administrators have also changed the policies to permit quiet socialization as opposed to silence and have conveyed this to students through signage.

However, administrators interviewed stated that student services located in the PJLC expressed that the recent addition of café and the increase in student activity that it encourages negatively impacts their work and students’ need for a quiet learning environment. In an attempt to reduce the volume of noise, signage has been posted in the hallways to communicate to campus members that students are studying or testing in adjacent areas. As Administrator (A4) described:

There were some noise complications with the instruction of bringing a buzz to the [first floor of PJLC] which used to be very quiet. Well, that is not what we imagined for a vibrant university campus with life on campus. So, part of it is helping people think a little bit differently about their role in the university, in that you don’t have doors closed and everything is just nice and quiet. I think we need to get a little messy and have some noise—and I think we are trying to find a balance.

Attempting to reduce socializing in reserved quiet spaces has been reinforced through restricting the use of technology, particularly cell phones, in these environments. Administrators have instituted policies and posted signage asking students to refrain from talking on their phones. However, the observations conducted in this study indicate that students tended to ignore this policy.
4.4.6. Services and Resources

The student services and resources provided in PJLC have evolved over time. Currently, the PJLC offers several services to students that include the Writing Centre, Math Centre, Assessment Centre, Instructional Media Services, and computer lab. Since the inception of the PJLC, administrators desired to create an environment focused on developing student skills, providing personal assistance, and access to further learning resources such as books and technology. Administrators interviewed observe that students, both traditional and mature, often use the PJLC for research, to view videos, access computers, photocopy, and use the printers to print out assignments and learning materials. Retail and food services have also been instrumental in attracting UFV campus members to the building. In addition, when the PJLC was planned, a bus stop, parking, and a daycare centre were also placed in close proximity to the facility.

Administrator (A2) described the initial planning of services that would be provided in the PJLC:

The second component that seemed to be a natural fit in that building was what we used to call the Math and Writing Centre where students could hone their skills in either numeracy or literacy. There were some other prerogatives too. The main one was, that if in fact, this was to be a place where students come and learn, like the classroom, it needed to be easily accessible even when the rest of the place was closed. This building needed to be close to a bus stop since people would come to study in the evening especially if those people didn’t have their own transport. Having its own bus stop would be a useful thing. And the final element of it was it would be useful to have it close to a daycare centre so that when we had single moms that were coming to do their studies in the evening, it would be somewhat helpful to leave their tot.

Although many of the services that were originally implemented still exist today, the daycare centre now serves as the Centre for Indo-Canadian Studies. Administrators indicated that since the inception of the PJLC, aligning these services in and around the building has been essential in providing students with a supportive and convenient learning environment. During her interview, Administrator (A3) discussed how administration had formed a learning commons group comprised of staff representatives from each student service in the PJLC. The intention of this group was to help guide the
services rendered in the PJLC. As she explained, the objective of the learning commons group was “to encourage people to think of this building as dynamic and much more than a resource for just books from the library or going to IMS [Instructional Media Services] but as a destination.”

Administrator (A3) continued to explain that many discussions have revolved around what should be implemented in the PJLC, how to best align the physical facility with these learning services, and how to maintain some flexibility in the space for future development. As she stated about the PJLC’s space, “I think it’s something that has to kind of be adaptable because students change and needs change and the opportunities change. These renovations have made this area an entirely different space.”

Administrator (A5) emphasized that the PJLC’s gain in popularity and use has increased students frequenting the services located in the facility. Students were described as often entering the library for assistance in order to get acquainted with the university and the services it had to offer. Administrator (A5) explained that the library’s Information Desk fields many of questions from new students learning about the campus and the services it provides. She also discussed further expansion of this feature in the future.

Creating a positive first impression and introduction to the campus has been a new role for the PJLC. Administrator (A1) highlighted that the PJLC is frequently the first building that students are acquainted with, as they often have to use the Assessment Centre for testing and placement. She also stressed that the rotation of services and resources provided in the PJLC has been to “try to keep it more in line with that Learning Centre objective.”

4.4.7. Summary

Administrators interviewed for this study perceive student learning in non-formal learning space as technologically supported, socially driven, and multitask-oriented. Administrators indicated that students’ use and dependence on technology have grown significantly, as have students’ expectations of the university’s infrastructure in supporting it. Accessing learning resources, references, course software, and
assignments are now done primarily online. Administration also notes that students expect course content to mirror the structure and organization of information as dictated by the web.

Over the course of these recent renovations, including the addition of the café, administrators described that PJLC has become a social hub where students are frequently seen interacting with one another. They identified this growth in usage of the PJLC as one of the successful outcomes of the refurbishment. The increase in socializing has introduced a host of unanticipated challenges for the planning and programming of the facility. Administrators expressed that the balance between creating a vibrant, socially dynamic environment and supporting students’ needs for a quiet, focused space is being tested. Remodelling of the PJLC has continued in order to address concerns raised by staff regarding the escalation of noise.

Administrators interviewed also observe students frequently engaged in a variety of tasks that include reading, talking with a friend, and eating. Administrators convey concerns over students’ ability to multitask and concentrate on their intended learning activity. As there are few restrictions on how the PJLC’s non-formal environment may be used, students’ tendency to multitask in one space was also perceived as beneficial in that it allowed the user to stay in one location without having to move frequently.

The transition in pedagogy resulting from a proliferation in technological advances, the diversity of students’ educational needs, and a myriad of recognized and accepted learning preferences have all underscored the importance of creating zones and providing flexibility in the design of the PJLC. Zones include those that support group work, student collaboration, quiet study, casual conversation, and food and beverage consumption. Policy changes to operational hours, the consumption of food and beverages, and communication in the PJLC have allowed students to gain further access to services and to use space for other activities, including social and dining purposes. Assessing and addressing student learning and engagement vis-à-vis numerous avenues have been instrumental in providing students a space that encourages use, supports diverse learning activities, promotes interaction, and increases their duration of time spent on campus.
4.5. **Student Interviews**

During the winter term of 2011, five interviews were conducted with students who experienced using the PJLC and are familiar with the building pre- and post-renovations. Student participants were also employees of the institution and four of the five worked directly in the PJLC. Of the five student participants interviewed, three were female and two were male. On average, the participants indicated that they spent 2.7 hours a day in the PJLC for learning purposes. Four of the five students graduated between 2010-2011 from UFV and had attended the institution for 4 or more years. Student participants’ average age was 32 years old. Historically, UFV has served the Fraser Valley’s adult learners and continues to attract a mature student demographic on campus.

4.5.1. **Introduction**

This section addresses the question: What are learners’ perceptions, observations, and experience using the PJLC? The students interviewed described the PJLC as a place for learners to engage in a variety of academic and social activities; receive assistance and support on assignments; collaborate with others; and access technological resources. The renovations to the PJLC have also introduced a series of new challenges for users and their intentions with the space. Data compiled from these interviews illustrate students’ interpretation and utilization of the PJLC and are categorized as five themes: pedagogical influences, physical design, services and resources, operational features, and technological resources.

4.5.2. **Pedagogical Influences**

Pedagogical influences pertain to those factors emanating from the university’s faculty and curriculum that encourage students’ learning outcomes such as research, collaboration, skill building, and critical thinking. According to students, the PJLC influences and enhances performance in coursework, projects, presentations, and other related research. Student (S5) explained that her discipline requires students to participate frequently in group work through collaborating on assignments and giving group presentations:
I think the way that classes are taught here, particularly in the business program, there is a huge emphasis on group work in the business program, and one of the things I noticed, particularly when I got into the second of the 200-level courses was that that increased.

Given the course emphasis on group work and presentations, she stated that locating a space in the PJLC where teams could perform a “dress-rehearsal” is difficult. She noted that, “there aren’t smart rooms that are available for us to practice unless we sneak into a meeting room that was set up that way.”

The PJLC’s hours of operation and designated Group Study Rooms make it a popular choice for group collaboration; however, Student (S5) emphasized that students “needed to have access to the facilities here [UFV] for longer than people thought previously.” She explained, “I think many students are not just students but they are working part-time to pay for school.” She described that finding a location that accommodated everyone’s work schedule was difficult.

Student (S1) indicated that as he advanced in his coursework, the PJLC student services and resources failed to progress with his course content. He also described that the library’s selection of books in his field of study as limited and outdated, and that the Math Centre’s expertise only helps those students enrolled in basic Math classes. Student (S1) explained the challenges during his process of learning advanced concepts in his field: “I often couldn’t make very good leaps because I didn’t know how to do it. And I went and looked in the library here for other books.” Commenting on the library’s two texts that are still relevant in his field of study, he stated, “Statistics is like medicine! This is fast moving field! You need the latest books. They have 10 to 15 books on regression that are at least 15 years old.”

Enrolled in two programs, Student (S3) described that the pedagogical differences of each program influenced how often she utilized the PJLC. She specified that one of her programs met primarily face-to-face and the other program solely conducted its coursework online. She described that the program requiring physical contact resulted in her utilizing the PJLC because she was physically on campus. She also indicated that the PJLC student support services were instrumental during her most challenging courses. She stated utilizing the Writing Centre for help on composing
essays and the Math Centre for her last Statistics course explaining, “That was the most time I spent in the learning commons: taking a Statistics class and needing constant help.”

4.5.3.   Physical Design

The environmental and spatial features of the PJLC consist of the factors such as lighting, acoustics, visual and social distractions, comfort, and workspace. Student-interviews indicated that these factors are influential in the selection of a space for their learning needs.

Lighting

Lighting was described by four of the five participants as a significant determinant in their choice of learning space. All student-interviews indicated that they preferred to learn in environments exposed to natural light as opposed to artificial light. Students described lighting as influencing their utilization of the space, as well as their comfort and health.

Student (S1) explained that he also preferred to learn in environments saturated with “Lots of light and bright rooms with sunlight with natural or artificial light but not the fluorescent lights.” Student (S3) favoured naturally lit learning spaces and access to windows. She mentioned that she often used her PJLC workspace as a learning space and highlighted that several office spaces within the PJLC are devoid of natural light. Similarly, Student (S5) commented that artificial lighting was the primarily source for lighting her workspace. However, she attributed artificial lighting to her headaches and stated that she preferred working in a dimly lit environment as opposed to utilizing the artificial lighting available. Student (S4) explained that he spent a great deal of time in the computer lab and preferred working in spaces near windows that provided natural light. He described that in general, computer labs tend to be predominantly illuminated through artificial lighting and he expressed that design changes needed to be made to introduce daylight in these settings.
Distractions: Audible, Visual, and Social

Students’ expressed their preference to learn in spaces that were relatively quiet and void of social interruptions and visual disturbances. During her interview, Student (S2) frequently emphasized the need for her learning environment to be insulated from others. She highlighted that one of her favourite spaces in the PJLC to study is the silent study space on the Library’s second floor. She described her preferred learning environment as, “Upstairs, in a quiet space in a cubicle and amongst the stacks.” She further explained that the library’s silent study space is a way to “…escape from the rest of the campus. You’re left alone. People don’t bug you. You can focus because you don’t have the distractions around you.”

Similar to Student (S2), Student (S4) explained that he preferred to learn in a quiet, contained environment, insulated from the main activity of the PJLC. Studying primarily on the PJLC’s second floor, he noted that there are certain spaces within the PJLC that are quite active with students transitioning between services and arriving from the bus station. The PJLC’s entrance areas are particularly distracting for him and he noted that the movement of people around him visually disturbed him and interrupted his concentration.

Student (S3) also indicated that she gets “distracted easily” and described her learning style as one that requires a quiet, isolated area where socializing is at a minimum. She explained that this may be due to her age and that as a mature student her thought process and tolerance for audible and visual distractions may differ than younger, traditional students entering from high school. She recounted frequently closing the door to her office in the PJLC to reduce the noise generated from campus members using the café and Writing Centre Anteroom.

Two of the five students stated that low frequency ambient noise was acceptable in their learning space. Student (S5) explained that she initially assesses an environment based on the level of noise she hears while entering the space. She described that she enjoys listening to soft classical musical when she is studying and will often tolerate some ambient noise in her space. However, she did emphasize that was a fine line between an environment being too loud and too quiet:
I guess the first thing for me is the noise level. If it's too noisy I will go somewhere else or, if it's too quiet or too silent. I think for different people each of those things [such as] light, temperature are important. Having a space where I can sit where there is a certain level of ambient noise helps me concentrate, so I would probably never use the silent study area upstairs.”

However, she often observed the influence noise level had on other students around her and interpreted a student’s departure of the space as an indication that the environment was getting too loud. Student (S1) explained that he favoured learning in a quiet space and described ambient noise as tolerable. He elaborated on the social aspects of learning within the campus environment and conveyed that after a period of time you acclimate to the social dynamics of sharing a common learning space with others. Although he often studied individually, he described that he didn’t object to working around larger groups and in fact found that “in some ways working around large groups is easier than working by yourself. Not necessarily with people but kind of just around. I enjoyed that.”

**Comfort**

“Comfortable” was a term frequently mentioned during the student-interviews and they used it in association with their descriptions of the PJLC’s furnishings, colours used in the space, temperature, policies regarding the permission of food and drink, and the sense of safety and familiarity they had with the space. Student (S2) described how the renovations of the PJLC have increased her comfort in utilizing the space. As she described, comfortable spaces are “not like a desk in a classroom. It’s not like a hard chair in the cafeteria.” Student (S2) defined comfortable as soft seating, flexible furniture arrangement, and temperature. She also indicated the change in policy allowing beverage consumption in the library, the access to learning resources, and the accessibility to a variety of learning spaces contributed to her comfort.

Prior to the PJLC’s renovations, she explained that the Library lacked the technological resources she needed and as a resort utilized the computer lab. She indicated that she felt “uncomfortable” using the lab stating, “I didn't like the [Envision Computer] lab space upstairs at all but I had no choice but to use it at times.” When asked to describe what made her feel “uncomfortable,” Student (S2) conveyed that, “It
was louder. There wasn’t anybody really monitoring it properly. It was kind of messy and it just didn’t feel comfortable.” She also described that since the renovation to the library, the new computer workstations are well organized and stocked with resources. Student (S2) also mentioned that access to learning resources and Internet services had been improved, allowing students to monitor email communications and have greater connectivity to instructional materials and research. She also felt that the reorganization of the space had quieted students’ socializing in the area.

Student (S5) indicated that she found comfort in places that are aesthetically pleasing with soft-seated furnishings. She described that the “attractiveness” of the space is conveyed through the physical design of the environment including the style and comfort of furnishings used and colour on the walls. Due to back pain, Student (S5) explained that if she intends on staying in a learning environment for more than a few hours that furnishings need to be soft and adjustable.

For Student (S1) comfort was also defined by the aesthetics of the environment and the amount of workspace accessible. He observed that the colours primarily used in the library and learning commons are a neutral “grey” and unassuming. He justified using brighter colours believing that they correlate with greater productivity and learning. Student (S1) also described his need to find areas that support large open tables. He revealed that his learning materials require a substantial amount of workspace and expected the furnishings provided to accommodate them. Based on his observations and research, he suggested there are gender differences in how students’ utilize learning space. Student (S1) explained that male students tend to use the workspace directly in front of them and that female students tend to laterally disseminate their learning materials.

Student (S4) also explained that his comfort in a learning space relies on the design and size of the furnishing provided. He described that he has a computer, books, and additional learning materials that consume a great deal of workspace. He elaborated on the matter by illustrating that the computer lab partitions its workstations with dividers that limit his space and thus ability to do work at the terminal stations. As a result, he often utilizes the back tables where there are few terminals, no partitions, and ample work space to organize his materials.
Student (S3) expressed that her comfort is conveyed through her sense of familiarity within the environment. She mentioned that during her work breaks her PJLC office converts to her learning space and explained that her sense of spatial comfort depends on her familiarity of the space. She elaborated that during her learning process that it was key for her to know where all her learning resources were, to have access to the same computer, and be able to exercise a certain level of environmental control over the distractions resonating in the PJLC.

4.5.4. Services and Resources

The theme services and resources describe the importance in the PJLC’s programming of space and how the proximity and inclusion of these services and resources were identified as influencing students’ ability to fulfill a variety of learning needs and preferences. Students described that the learning services provide extra support during their more challenging courses, offering one-on-one personal assistance, and access to expertise. They also indicated that the programming of the PJLC and its consolidation of student services and learning resources in one central location provide a “one-stop shop” learning experience for those utilizing the facility.

As explained by Student (S3), the PJLC’s student services have been instrumental during her transition into college life. The Writing and Math Centre were identified as vital to her successful re-entry process. She recounted how student services reacquainted her with course expectations and provided the resources and support to help update her writing and arithmetic skills.

A Math major, Student (S1) utilized the Math Centre to study, connect with other Math students, and receive help. He indicated that many students who enter the Math Centre often require one-on-one assistance with their assignments and stressed the importance of “having expertise in a human form, not in a machine form.” He also explained in math the process is as important as the result and having access to expertise who can help guide you through the process is important. For more standard problems, he indicated that the Math Centre also provided a select number of computers for students to use for their coursework.
Student (S5) recalled spending a great deal of time in the Math Centre seeking help and support on her assignments. Due to working full-time, she found it difficult to coordinate her schedule with her professors as well as access student services. Further compounding her frustration was the Math Centre weekday operational hours and her inability to access the service after 6:00 p.m. She expressed how desperately she wanted to utilize the help provided by the Math Centre but that her work commitments and the early evening closure of the Math Centre made it impossible to get the assistance she needed. Student (S5) perceived that the number of university students employed has increased and suggested that the student services, such as the Math and Writing Centre, be open later in the evening to accommodate students’ work schedules.

Student (S2) utilized several services, including the PJLC’s Instructional Media Services (IMS) for printing out research posters, in addition to booking rooms for research interviews and focus groups. She described that the addition of more technological resources, particularly in the library, had provided her the tools for viewing videos and printing out educational material. Student (S2) indicated that having access to technological resources throughout the PJLC provided students with the ability to engage in the learning activities and complete assignments from a variety of locations.

Students strongly felt that the addition of the Clickz Café has been instrumental in increasing campus members’ usage of the space and altering the environment from a quiet study setting to a socially dynamic hub. Student-interviews explain that the food and beverage service has increased campus usage of the PJLC, as well as the increased the length of time members spend in the facility. The ambience, seating, and tables were cited as providing students with an informal place to linger, meet, study, and socialize. However, as excited as students indicated they were to have this new addition to the PJLC, they also revealed the challenges with the increase in socialization. As Student (S3) observed:

I would say that there is more socializing because of the café, Tim Horton’s, and the atmosphere of the building. It’s more open to socializing. So definitely the noise level has increased which has been great for students to socialize but it’s not always great for some of the [academic] services.
Student (S3) indicated that student services that focused on providing academic support and tutoring have expressed concern over the volume of noise distracting their students studying in the space. Several students emphasized that the popularity of the space has also resulted in greater traffic and bottlenecking around the entrance of the facility. Student (S5) described the lines for coffee as “heading out the door” and explained that by the time you are serviced by the café your break is over. Many of the students interviewed recommend enlarging the space, increasing service staff, extending operational hours, and offering greater food options to accommodate the demand.

4.5.5. Operational Features

Operational features included those aspects of the PJLC that pertain to the managerial decisions and policies regarding how the space is designed, utilized, supported, and supervised. The non-formal learning space provided in the PJLC is not heavily monitored; therefore, the space must communicate its intended behaviour through its physical design, operational hours, and access to services and resources.

Services: Hours and Access

Students overwhelmingly expressed frustration over the operational hours of the PJLC’s student services. Students felt that the PJLC’s Writing Centre, Math Centre, library, café, and computer lab hours should correspond more closely to the PJLC’s facility operational hours. Although the PJLC is open until 11:30 p.m. on weekdays, students clarified that many of the services closed between 4:00 p.m. and 6:00 p.m. The library and computer lab remain open until 10:00 p.m. During the weekends, the PJLC’s facility was accessible but only two of the six services were open, and the operational hours were limited both Saturday and Sunday.

Part-time student (S5) recounted her experience attempting to utilize the Writing and Math Centre. She indicated that although she had access to PJLC building, the Writing and Math Centre’s closure time between 4:00 p.m. – 6:00 p.m. on weekdays was problematic. She explained:
I don’t know how other universities are set up, but for me the Math Centre and Writing Centre are part of the library, and therefore they should be open the same hours as the library because students would make use of them. I would have been here in the evenings, when I was studying at home, if I knew I could have access to a professor that could help me with the stuff I was struggling with. But I could only get to see my professor if I was lucky for an hour each week.

Part-time Student (S2) concurred, “[Administration] should have food services available to students later if they are going to have the building open later and even the library. If they are going to have the building open, they should have other resources open.” Student (S4) indicated that he periodically received complaints from other students regarding the operational hours of the services provided in the PJLC. As he expressed, students don’t understand why services, such as the library and computer lab, close at 10:00 p.m., while the PJLC continues to stay open for the next hour and a half. Student (S1) believed that administration’s justification for the limited weekend hours and services was informed by their perception that fewer students attend on weekends; however, as he perceived, this is somewhat paradoxical. Based on his perception, he felt that fewer students utilized the PJLC during the weekends because the PJLC had limited operational hours.

Following the renovations to the PJLC, students observed how usage of the facility had increased dramatically. Greater usage of the building has introduced a host of new challenges for those using the space and services including students’ territorial behaviour and greater competition for resources such as technology, personal assistance, and space. Student (S4) described a confrontation he encountered with another male student over the use of space. While studying on Rotunda’s second floor, Student (S4) asked another male student to turn down the music he was playing on his computer. The student responded, telling him to go use the library if he wanted to work in a quieter environment. Student (S4) stated that to avoid further confrontation he didn’t respond to the student’s remark and left the space.

Students (S4) and (S1) also described that the increase in usage of the PJLC and its services increased the competitiveness for space in student services such as the Math Centre. Student (S4) indicated that when he attempted to access the Math Centre it was frequently “full of students” with no place available to sit. Students (S4) and (S1)
also suggested that the addition of group tables and seating to the Centre would accommodate more students as they often walk away because of the lack of room.

4.5.6. Technological Resources

Students interviewed describe that their learning in the 21st century has been primarily influenced by the integration of technology. Student (S3) described her experience transitioning to a virtual learning space:

I believe that technology is now a necessity for learning, and although I started in a program that used little technology, I transitioned into an 80% online program. As a result, I find that I rely on technology and feel lost without it. There are positive and negative aspects to the technological change. Positive is the ease of access to information and resources online. Negative is the dependency that I believe I have to the Internet for information retrieval.

Student (S3) observed that over time that areas of the PJLC dedicated to technology have increased in student usage and that the computer lab is frequently full with students. Furthermore, she stated that UFV instructors have been incorporating technology more in their classrooms, migrating to software such as Blackboard for creating online discussion groups, disseminating course content, and posting assignments.

Students interviewed described that the PJLC technological resources were instrumental in helping them prepare and complete their assignments. Students identified that access to computers, wireless Internet, DVD/VCR player, printers, photocopiers, presentation equipment, and course software were essential tools in fulfilling their learning activities. Computers, printers, wireless Internet, and photocopiers were highlighted as equipment instrumental in students’ ability to work on assignments; check course-related email; gather and share research materials; and access academic journals and e-books.

As a re-entry student, Student (S2) also observed the proliferation of technology in academic settings and students’ dependence on it, as well as instructors’ expectations that students use technology. She described that over the past decade she has
witnessed the PJLC’s expansion of technological resources via the wireless Internet and access to computers within the facility. She emphasized that the library’s computer workstations, email stations, and the computer lab have supported students’ connection to information and learning resources.

As Student (S5) advanced in her coursework, she specified that technology supporting her group assignments and presentation preparation were vital. She indicated that presentation equipment, such as a LED projector and computer, are necessary for today’s group presentations. She also recommended that the PJLC should outfit their designated group rooms with this technology.

Student (S4) highlighted the PJLC computer lab as one of the few places where he was able to access the course software required in his discipline. He conveyed that the cost of his discipline’s course software financially prohibits many students from purchasing their own copies. As a result, students utilize computer labs to work on their projects. Student (S4) and Student (S2) also indicated that many of their assignments needed to be submitted in a hard copy format as opposed to electronically. They both emphasized that printers in the PJLC were vital in reviewing drafts and submitting of the final copy of their assignments.

4.5.7. Summary

Overall, students indicated that the renovations to the PJLC have been instrumental in meeting their learning preferences and needs. For many of them, access to technological resources were essential in researching, editing, and completing assignments. Students indicated that they preferred learning in spaces that were naturally lit, relatively quiet, void of social and visual distractions, allowed for the consumption of food, and accommodated their learning materials. The redesign of the PJLC has also influenced students’ learning experience. Several students describe the facility as more comfortable to learn in due to the soft seating, flexible seating arrangements, new paint, and access to a variety of activity zones and resources supportive of their education.
The facility’s increase in use and foot traffic have resulted in greater movement and noise within the space. Socializing is on the rise as students meet up with others, study together, and lounge—and occasionally find a comfortable couch and fall asleep. Hence there is greater competition for space and demand for resources. The modifications for greater seating and lounge areas have also introduced a variety of activities not witnessed in the space before. Students now observe their peers engaging in variety of activities that include: listening to music, visiting social media sites, socializing, and watching videos.

Students interviewed assert that the PJLC’s redesign, policy changes, and addition of food and beverage services have influenced their frequency and duration of use of the facility. Learners also indicated that the longer they utilized the facility, the more likely they were to engage in a variety of activities. As a result, students indicated that the PJLC should accommodate for this flexibility by increasing the evening hours of student support services; providing collaborative spaces outfitted with technology; offering learning spaces with access to natural light; updating technological resources; separating the PJLC’s social spaces from student services; and increasing the occupancy of the café while providing patrons greater food options.

4.6. Findings

Students described the influence that pedagogy had on the use of the PJLC. Several students interviewed explained that the PJLC provided them with access to expertise, one-on-one assistance, group space, and additional educational resources needed to successfully complete their courses and assignments. As students advanced in their coursework, content became increasing difficult and several of them noted utilizing the PJLC for extra help.

The PJLC also served to accommodate students’ needs to gather with others and complete projects in a collaborative atmosphere. Administration and students also agreed the course delivery type, such as online versus face-to-face, as influential in students' presence on campus and therefore exposure and use of the PJLC.
Furthermore, students interviewed who attended their courses on campus recounted utilizing the PJLC more often than when they were enrolled in online classes.

Administrators interviewed mentioned how academic courses and instructors’ learning objectives influenced the use of the PJLC. However, there was very little discussion regarding supporting pedagogy outside the classroom and this may be a gap in administration’s planning and design of campus space. The inclusion of pedagogy as part of the campus planning dialogue as well as how to best align space with the educational planning of the institution may be an area for administration to address.

The physical design of the PJLC, including environmental and spatial characteristics such as the setting’s lighting, frequency of distractions, and comfort were indicated as influential in students’ selection of a learning space. Preferred learning environments were described by students as being furnished with windows in order to provide student access to ample amounts of natural light. Artificial lighting was frequently mentioned as a source of physical discomfort for students, particularly those who experienced headaches after exposure.

Students also stated that they selected learning spaces that were described as quiet, settled, and insulated from audible noises, visual disturbances, and social distractions. Noise generated from surrounding spaces was frequently characterized as disruptive. Transient spaces that were subject to a great deal of movement were also noted as distracting and less desirable.

Comfort was also stressed as an important element in the selection of learning spaces. Students explained comfort in association with the PJLC’s furnishings, colours used in the space, temperature, policies regarding the permission of food and drink, temperature, and the sense of safety and familiarity they have with the space. In contrast, students described learning spaces as uncomfortable if they were audibly loud, physically disorganized, and unmonitored by university staff.

Administrators interviewed commented that they have worked towards providing students spaces that were flexible in design, comfortable, aesthetically pleasing, technologically supportive, and versatile. The recent renovations were cited as providing campus members with access to more socially collaborative spaces that encouraged
students to utilize the space frequently and for longer durations. Zoning of the PJLC for specific activities has been a strategy to maximize the use of the facility while providing students a variety of learning environments to choose from.

Administrators and students identified the services and resources programmed and provided in the PJLC as instrumental in supporting students’ progress during their coursework and degree completion. The library served as the focal point for many students accessing study materials, conducting research, and working on assignments. It also provided group rooms designated for students to work collectively on assignments. The Math and Writing Centres were indicated as offering students access to one-on-one support for assignments, in addition to providing an environment furnished with additional computers and books specific to the subject matter.

Students expressed frustration over the operational aspects of the PJLC, including those managerial decisions and policies influencing the design, utilization, support, and supervision of the space. Students identified that the operational hours of student support services should correspond more closely to the operational hours of the PJLC. Employed students also indicated that access to student support services in the evening would offer them additional help and resources after work.

Administrators stated that they have worked on extending operational hours of student services such as the library and the Clickz Café to provide greater access to academic resources and food services. They have also modified policies to allow for socialization and beverage consumption in the library. These changes to policy and operations have been to encourage student utilization of the PJLC and to accommodate campus members’ learning objectives.

Students and administrators described that technology has become ubiquitous in the university setting. Both participant groups depict technology as embedded in several facets of the educational experience from conducting research to connecting with other students and faculty. Reliance on the PJLC to support and offer access to technological equipment such as computers, printers, DVD players, photocopiers, and presentation equipment has increased and periodically created a competitive atmosphere for campus members desiring its use.
As this chapter recognized, there are several benefits and challenges of multifunctional learning environments. Administrator and student interviews provided an expert perspective in the planning, design, and usage of the space as it has evolved over the past 5 years. The next chapter addresses the actual performance of the PJLC as a learning environment and assesses the technical, functional, and behavioural aspects of the facility.
5. Results: Evaluation

5.1. Introduction

The purpose of this chapter is to present the casual observational data that informed the space performance evaluations conducted on each learning zone identified within the PJLC. Images of the facility supplement the space performance evaluation by offering visual indications and evidence of campus members’ behavioural influence on the space. This data contributes to understanding the relationship between the technical, functional, and behavioural features of the PJLC and responds to the question: How does the PJLC perform as a learning environment?

5.2. Chapter Organization

The chapter begins with ‘Casual Observations’ that review the observational data procedures undertaken, the occupants’ activities identified, and proceeds to identify the zones identified in the study. The following section ‘Space Performance Evaluation’ is organized by the observed PJLC zones. These zones consist of Group Study Rooms (G170A, G170B, G170C, and G131), the Library’s 1st floor (G170), the Library’s 2nd floor (G242, G240, and G260), the Rotunda and Writing Centre Anteroom (GH102, GH210, and GH120), and Clickz Café (G168). Each zone is described based on its intentions; physical design; observations of technical, functional, and behavioural characteristics; and images illustrating the space. The intention of the zone provides information regarding administration’s original purpose behind the space. The design portion describes the physical characteristics of the zone such as its size and furnishings. The observations segment notes the general behaviour of campus members utilizing the area. The detailed worksheet that accompanied each zone is provided in Appendix D through Appendix I of this study.
5.3. Casual Observations

This section pertains to the observational data gathered on the PJLC. The PJLC was observed for a total of 85 hours, from February 2011 to April 2011. Fifty-one hours (51) of observation were used to casually observe the space, establish a coding system, and conduct a space performance evaluation of the PJLC’s technical, functional, and behavioural features. Thirty-four hours of structured observations then followed utilizing the coding system and documenting campus members’ activities.

5.3.1. PJLC Activities

During the casual observation period, a coding system was developed based on the observable activities in which students were engaged. As shown in Table 3, a total of 10 activities were identified and their definitions are provided below. The activities included: cell phone usage, consuming food and beverages, listening to music, reading, researching, sleeping, socializing, studying, viewing videos, and waiting for friends/transportation.

Table 3. Activity Categories and Definitions

<table>
<thead>
<tr>
<th>Activity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell phone usage</td>
<td>Occupant actively involved in texting or talking on the cell phone.</td>
</tr>
<tr>
<td>Consuming food or beverages</td>
<td>Occupant actively engaged in eating or drinking.</td>
</tr>
<tr>
<td>Listening to music</td>
<td>Occupant listening to music via technological device.</td>
</tr>
<tr>
<td>Reading</td>
<td>Occupant quietly engaged in casual reading such as school newspaper or magazine.</td>
</tr>
<tr>
<td>Researching</td>
<td>Occupant actively searching for library materials, books, or using research-designated computers.</td>
</tr>
<tr>
<td>Sleeping</td>
<td>Occupant lying down with eyes closed or sitting upright with head down and eyes closed.</td>
</tr>
<tr>
<td>Socializing</td>
<td>Occupants actively conversing with one another face-to-face.</td>
</tr>
<tr>
<td>Studying</td>
<td>Occupant quietly engaged in reading textbooks, taking notes, and working on laptop.</td>
</tr>
<tr>
<td>Viewing videos</td>
<td>Occupant watching videos on personal computers or library designated video machines.</td>
</tr>
<tr>
<td>Waiting for friends/transportation</td>
<td>Occupants standing or sitting in the PJLC entrance area waiting for friends or transportation.</td>
</tr>
</tbody>
</table>
5.3.2. PJLC Zones

The data was collapsed into five zones that were similar in intention, design, function, and behavioural activities. Shown in Table 4, these zones consist of Group Study Rooms (G170A, G170B, G170C, and G131), the Library’s first floor (G170), the Library’s second floor (G242, G240, and G260), the Rotunda and Writing Centre Anteroom (GH102, GH210, and GH120), and Clickz Café (G168). Collapsing these spaces into zones that share similar features provides a greater understanding as to these how related environments were functioning as a whole.

Table 4. PJLC Zones and Room Numbers

<table>
<thead>
<tr>
<th>Zone</th>
<th>Room number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Study Rooms</td>
<td>G170A, G170B, G170C, G131</td>
</tr>
<tr>
<td>Library 1st floor</td>
<td>G170</td>
</tr>
<tr>
<td>Library 2nd floor</td>
<td>G240, G242, G260</td>
</tr>
<tr>
<td>Rotunda/Writing Centre Anteroom</td>
<td>GH102, GH210, GH120</td>
</tr>
<tr>
<td>Clickz Café</td>
<td>G168</td>
</tr>
</tbody>
</table>

5.4. Space Performance Evaluation

The space performance evaluations (SPE) and photographs provide further documentation and support revealing the changing patterns of usage and function of the building during its operational hours. Evaluations of the space conducted in the morning, afternoon, evening and night captured how students utilized and modified the PJLC’s learning environment for their activities. This method also recorded the behavioural traces and indications of student activities through capturing the arrangement of furniture; school items left behind; and discarded coffee cups and food wrappers.

The SPE indicated the challenges with both flexible and fixed furniture configurations as well as technical aspects, such as access to electrical outlets and lighting. Photographs documented the changes in the furniture configuration that campus members would alter frequently throughout the day. For example, students
would relocate chairs and tables to accommodate for larger groups. This resulted in some spaces experiencing an imbalance in their furnishings such as a table left with no chairs. Photographs also recorded the influence of technical features, such as electrical outlets and lighting, on the utilization and design of the space, as students often adjusted or left the environment in order to gain access to these features. The following segments address in greater detail each zone that was observed and its intention, design, and actual usage.

5.5. Group Study Rooms

5.5.1. Intention

The PJLC Group Study Rooms were designed for the purpose of supporting collaboration and group work. These spaces are identified on the blueprint as G170A, G170B, G170C, and G131. Although Group Study Rooms G170A, G170B, G170C are located on the library’s first floor, they were placed into their own category because their design and intentions were to provide a place for groups to socialize, study, and work on projects collaboratively. In addition, the policies pertaining to the access and utilization of Group Study Rooms differ greatly than the policies governing the surrounding environment. These rooms are designated for enrolled UFV students; students must provide their student ID to reserve the space. During the library’s operational hours, students may book these spaces in 30-minute blocks for up to two hours at a time. In addition, the Assessment Centre (G131) was available one evening a week for student group use. Group work and socialization were supported in the space by design and designation (see Appendix D for the group study room space performance evaluation).

5.5.2. Design

In size, group room G170A is 15.35 m², G170B is 15.46 m², and G170C is indicated as 15.06 m². The Assessment Centre space room G131 is 51.10 m². The total dedicated collaborative study space in the library is 45.87 m². When the Assessment Centre is also accessible for use, the total of group space available is 96.97 m². Group Study Rooms (G170A, G170B, G170C) were furnished with a moveable
group table and 4 to 6 chairs (see Figure 6). In addition, these spaces had access to a white board fixed on one wall. Due to the demand of the Group Study Rooms, each space had been subdivided with a soft partition wall allowing for two groups to utilize the space simultaneously. The interior wall was glass allowing for transparency into the space. The exterior wall was lined with windows allowing for access to natural light and views of the campus green. Window blinds provided the user the ability to control for privacy and intensity of light.

The Assessment Centre (G131) was intended to serve as a test-taking environment (see Figure 7). Due to the demand of study space, this room was recently designated as a student study environment during one evening a week. The area was furnished with a series of group tables, soft fabric chairs on casters, and a white board. The room’s interior wall bordering the hallway was glass; however, it was observed that windows were frequently covered to provide students greater focus and privacy while testing. There were no windows accessing natural light.

5.5.3. Observations

The Group Study Rooms were noted as primarily utilized by women for socializing and studying purposes. Students were observed as studying silently side-by-side with their peers. Occupants frequently modified the furniture arrangement to accommodate the number of individuals using the space, as well as for their intended activities and learning materials.

Students with observable physical disabilities were not witnessed utilizing the space. This may have been due to the entrance of the Group Study Rooms and the lack of space necessary to accommodate a wheelchair’s turning radius. The furniture in the room is fairly heavy, comprised of solid oak or medium-density fibreboard, possibly making it difficult for a wheelchair-bound student to adjust and pass through. When in use, the group room’s chairs were observed as scattered and often pushed closely to the wall making the space potentially difficult for a physically disabled student to circulate.
During the peak hours of use, the library's Group Study Rooms could generate a great deal of traffic and noise. Pairs of students would frequently enter and exit the rooms with food, beverages, or learning materials. In addition, students utilizing the space would generally keep the doors of the rooms open and converse in a normal volume that would carry into the quieter areas of library. If the noise became too disruptive, students studying were noted approaching staff and requesting that groups quiet down or close their doors.

It was observed that the doors to the Group Study Rooms were rarely closed. This may have been due to the lack of ventilation, rise in temperature, and the need for occupants to access fresh air. Although the Group Rooms were equipped with large windows, they were fixed shut. Therefore, students utilizing the space were forced to open the door to provide for greater airflow and to reduce the temperature of the space.

The rooms were also furnished with both artificial and natural lighting that appeared ample for the activities that the students were engaged in. Students were noted as frequently adjusting the blinds often minimizing the natural light in the space. This may have been due to the sunlight’s intensity, elevated room temperature, glare on computer screens, or for privacy.

The Assessment Centre was observed as well utilized during the evenings that it was accessible to campus members. Groups primarily occupied the space for quiet study. The flexible furniture arrangement provided these evening students with a variety of configurations to suit their objectives; however, this was problematic for Assessment Centre staff entering the space the next morning as they would have to readjust the setting for test takers, clean the white boards, and discard trash.

Artificial lighting was the primary source of illumination. The glass pane wall was frosted and provided privacy for test takers although lacked the transparency for security to monitor the space at night when in use. Therefore, the door was kept open to provide security partial visual access to the environment.
5.5.4. Images

Figure 6. Library group study room (G170C).
Note. J. P. Ashby, personal photograph, March 9, 2011.

Figure 7. Assessment Centre (G131).
5.6. Library: First Floor

5.6.1. Intention

Originally, the PJLC library was designed as an environment dedicated to self-directed, autonomous learning and research activities. It was built to support one of the largest non-formal study spaces offered in the PJLC and occupies 3,149 m² of the facility. Internally, the space was originally furnished with 150 study carrels that were wired for computer use. In addition, four silent study rooms, two group study rooms, and a periodicals and newspaper reading area were also provided. Shelving space in the library accommodated 1,000 periodical titles, 66,099 monograph volumes, with the capacity to expand up to 180,000 monograph volumes. The facility was built to support an additional story if administration desired to expand the building.

Technologically, the library was initially equipped to host an online service that provided students with access to the library catalogue, periodical indexes, University of British Columbia and Simon Fraser University Library catalogues, British Columbia’s Electronic Library Network (BC ELN), and Internet. Also provided were 4 microcomputer workstations for access to CDRom databases, a video viewing room with 6 viewing stations, and 2 audio listening stations. Additional spaces included a library classroom intended for library orientation and research skills classes and a photocopy room with two photocopiers. Upon its opening, operational hours during semesters were set as Monday through Thursday 8:30 a.m. to 9:00 p.m., Friday 8:30 a.m. to 4:30 p.m., and Saturday 10:00 a.m. to 4:00 p.m.

The library’s first floor has been recently renovated to now serve both individual and collaborative users who are primarily interested in conducting researching, accessing technology, working on assignments, seeking general information regarding library use, checking out books and materials, making copies, studying individually, and working collaboratively (see Appendix E for the library’s first floor space performance evaluation worksheet).
5.6.2. Design

The library’s first floor is identified on the blueprint as G170 and is 1156.72 m² in size. The entrance of the library (see Figure 8) consisted of: an Information Desk; a circulation desk; a computer station outfitted with 10 designated terminals that students can conduct quick searches or check email; a computer station with 14 fixed terminals where students can conduct research and work on assignments; a microfiche viewing station; and a video station for students viewing films (see Figure 9). In addition, there were 8 individual carrels for silent study. These stations predominantly served those working individually. A series of book stacks lined the middle of the first floor separating the front and back of the library.

The back portion of library supported group work permitting quiet conversation. There were 7 group tables with 4 to 5 movable chairs located at each one (see Figure 10). Group tables were outfitted with six outlets providing students access to technological support. Individual student study carrels were intermittently placed between the group tables. Group Study Rooms (G170A, G170B, G170C) were also located in the back. As discussed in section 5.6.2. of this dissertation, the Group Study Rooms contained group tables, several chairs, and white boards. Located at the far end corners of the library were lounge areas arranged for group seating and furnished with soft chairs and coffee tables.

5.6.3. Observations

The main floor is divided into several distinct activity settings. The entry of the library supports campus members’ use of technology by providing individual computer stations designated for email, library reference searches, research, and assignments. Campus members were often noted as transitioning from one activity to the next. During the observational period, it was common to see students asking a question at the Information Desk, followed by checking email at the computer station, and later meeting friends to work at the group tables.

Patrons primarily used the standing computer stations for a few minutes to search for references and check email. The seated computer workstations were restricted to enrolled UFV students as they required a student ID to access. Students
used the seated computer stations to work on papers, print out assignments, and conduct research. It was observed that campus members utilized the standing terminals for shorter duration periods as compared to the seated terminals allocated for student research and assignment purposes. Campus members and students were observed as focused and quiet while involved in their activities. The library’s first floor layout and design also appeared to support the use of campus members with observable physical disabilities as wheelchair-bound students were witnessed utilizing the space. Modifications to the entry and exit area of the library had been made to eliminate the security bar from swinging into wheelchair-bound members chests as they passed through.

The back of the main floor is designed for both collaborative work and lounge space and consisted of group tables, individual study carrels, couches, and lounge chairs. During the observational period, it was noted that every week administration slightly changed the furnishings and layout. Primarily, these modifications involved the removal of individual study carrels and the addition of group tables and chairs. The group tables were outfitted with electrical outlets providing campus members a place to utilize and charge their technological devices. Campus members were observed utilizing the group tables as individuals, pairs and groups. Activities noted in the space consisted of studying, socializing, sleeping, and casually reading. Although food was not allowed in the space, covered drinks were permitted. Campus members were not observed consuming food and beverages in the area; however, the trash receptacles in the area contained doughnut boxes and coffee cups indicating, in fact, food consumption in the space.

Weekday morning hours were observed as slow with few users and minimal activity; however, during the afternoon and evening hours campus members’ usage of the space increased. The majority of library staff and administration in the PJLC do not work evening hours or weekends. As a result, a security officer was observed frequently circulating the library’s first and second floors during weeknights and weekends.
5.6.4. Images

Figure 8. PJLC library entrance. Exterior image of PJLC entrance.

Figure 9.  Library first floor (G170). Entrance of library.

Note.  J. P. Ashby, personal photograph, March 9, 2011.

Figure 10.  Library first floor (G170). Group tables at back of library.

Note.  J. P. Ashby, personal photograph, March 5, 2011.
5.7. Library: Second Floor

5.7.1. Intention

The library’s second floor (G260) is reserved for silent study, reading, and research. It is the only space located in the PJLC dedicated to silent, individual study. It also serves as an administrative space. The University Librarian and additional senior staff members' offices were located within the library's second floor (see Appendix F for the library's second floor space performance evaluation worksheet).

5.7.2. Design

The library’s second floor is identified as G260 and is 1221.83 m². Upon entering the library’s second floor, there was an Information Desk situated to greet incoming patrons. The exterior walls of the space were comprised of large windows that provided visual access to the Rotunda's interior, natural lighting, and views of the campus green. In addition, there were three rows dedicated to individual study carrels with each separated by a series of book stacks. The first row was comprised of 36 carrels placed in groups of four. The second row contained 22 carrels and the third row contained 84 carrels (see Figure 11). In addition, there were two rooms allocated for individual study that consisted of G240 (12.38 m²) and G242 (17.59 m²). These two rooms were also lined with study carrels. Room G240 contained 5 study carrels and G242 contained 8 study carrels (see Figure 12). In total, the space provided 163 individual study carrels for campus members learning activities.

5.7.3. Observations

During my observational period, students utilized the second floor primarily for individual study. The space was quiet, clean, and well maintained. The study carrels located at the entrance were all outfitted with electrical outlets; however, the study carrels located in the middle and back rows alternated between those that provided outlets and those that did not.
Several students were observed using the same study carrel each day indicating a pattern of usage and preference of that space. This was also noted with campus members who were wheelchair-bound, although their selection of usable study carrels appeared limited to those desks located at the end of each row as they provided the space to adjust, backup, and turn a wheelchair. Campus members primarily used the second floor as individuals with very few pairs or groups noted.

Activities in the space included quietly studying, socializing, conducting research, cell phone usage, sleeping, and watching videos. Cell phone usage is not permitted in the library. This was communicated through the signage located on the second floor. However, students receiving phone calls were observed taking their conversations just outside the entrance of the space. As a result, students’ conversations generated ambient noise in both the library’s second and first floor.

Although there were library administrative offices and an Information Desk located on the second floor, the Information Desk was observed as vacant and unmanned by staff. Students seeking library staff assistance had to return to the first floor to seek support. Library staff were observed organizing books on the shelves.

Lighting provided on the second floor consisted of both artificial and natural. It was observed that during days and evenings, the study carrels located near the windows and natural light were used in greater numbers than the middle row located between book stacks. The windows did not provide for ventilation as they were fixed; however, they did offer access to views of the campus green, students circulating the campus, and natural light.

There were no washrooms located in the library that were available for public use. The washrooms located on the second floor were designated as staff only. To access the lavatory, library patrons must leave and use the bathrooms located on the PJLC main floor.
5.7.4. Images

Figure 11. Library second floor (G260). The third row of study carrels.

Note. J. P. Ashby, personal photograph, March 18, 2011.

Figure 12. Library second floor silent study room (G242).

Note. J. P. Ashby, personal photograph, March 18, 2011.
5.8. **Rotunda and Writing Centre Anteroom**

5.8.1. **Intention**

The Rotunda and Writing Centre Anteroom are intended to serve campus members as places that support a wide array of activities such as individual and group studying, socializing, beverage and food consumption, and casual reading. For the purposes of this study, the data collected on the Rotunda’s first floor, second floor, and Writing Centre Anteroom were combined as they are not under the direct supervision of any student service and are accessible during the operating hours of the PJLC (see Appendix G and Appendix H for the Rotunda and Writing Centre Anteroom space performance evaluation worksheet).

5.8.2. **Design**

The Rotunda is identified as GH102 and GH210, and the Writing Centre Anteroom as GH120. The Rotunda's first floor is 44.58 m$^2$, the second floor is 132.33 m$^2$, and the Writing Centre Anteroom is 155.13 m$^2$ in size. These areas combine for total of 332.04 m$^2$. The first floor was furnished with a fixed study bar and a series of plastic moveable bar chairs (see Figures 13 and 15). The area was designed primarily for individual use. The Rotunda’s second floor was furnished with a fixed study bar and a series of fixed swivel bar stools stationed 58 centimetres apart from each other (see Figures 13 and 17). Three fixed group tables were furnished with three fixed seats. Three loveseat couches were also provided in the space. The Rotunda space provided views of Sumas Mountain, the parking lots, building A, and bus transit.

The Writing Centre Anteroom serves as the primary entrance to the Writing Centre. Located off of the PJLC main arterial hallway, it is directly across from the Assessment Centre. The space was furnished with a vending machine, two movable tables, four moveable chairs, a photocopier and an adjacent table to support photocopying (see Figure 14). The opposing wall had a row of fixed sofa bench seating with small lounge tables located in between.
5.8.3. Observations

The Rotunda's first floor was a transitional space next to the PJLC's north entrance. Campus members were observed socializing, casually reading a book or newspaper, consuming food/beverages, waiting for friends or transit, and engaged in cell phone use. During peak periods of utilization, movement in the space increased as campus members frequently entered and exited the building to catch public transportation. Foot traffic and socializing generated noise in the space echoing throughout the PJLC.

The Rotunda's second floor supported campus members working individually with a few small tables dedicated to collaboration. The couches were often observed as a napping area supporting those students that wanted to sleep. Additional activities noted in the space included: studying, socializing, casually reading, listening to music, consuming food/beverages, and cell phone use.

The Writing Centre Anteroom provided an environment that reinforced learning and collaborative activities in addition to absorbing café customers who were unable to locate seating during the café's peak periods of usage. Activities observed in the space included individual and group study, casual reading, listening to music, consuming food/beverages, socializing, and cell phone use. Campus members utilizing technology in the area were observed reorganizing the furnishings to access electrical outlets. The furniture arrangement was also adjusted to accommodate larger groups. As there were no trash receptacles in the Anteroom, discarded coffee cups and food wrappers tended to build up on tables and seating. The photocopier station provided in the area was not well utilized by campus members.

Wheelchair-bound campus members were observed negotiating their way through the Rotunda and Writing Centre Anteroom; however, no physically disabled student was documented utilizing these spaces for any activity. The lack of usage may have been a result of the fixed furnishings, including tables and chairs, and the height of the study bar and café tables. Circulating through the space also appeared difficult for wheelchair-bound students due to the narrow pathways.
Although the study bar was observed as well used, the height, width and depth of the furnishings appeared problematic. For example, due to the elevated height of the study bar, campus members were observed stockpiling their belongings on the counter and extending their learning materials into the counter space of those students adjacent to them. This allowed students easy access to their learning materials. In addition, they may have also felt that their belongings were safer if directly in their sight.

The seating provided was fixed and separated by less than 60 centimetres, and campus members were often observed seated in every other stool to accommodate their learning materials and belongings. This appeared to reduce the number of campus members able to simultaneously utilize the bar. Ergonomically, the fixed bar seating did not provide campus members of different heights and body types the flexibility to adjust for greater comfort while working at the bar.

Activity in the Rotunda and Writing Centre Anteroom declined during weekday evenings and weekends. Although the spaces were available for use, artificial lighting in these environments was frequently turned off during the evening and night (see Figures 16 and 18). The lack of lighting may have conveyed to campus members that the space not operational at that time. In addition, the fluctuation in temperature, humidity, and air current experienced in the environment may have also influenced use during evening hours.
5.8.4. Images

Figure 13. Rotunda first and second floor (GH102 and GH210).

Note. J. P. Ashby, personal photograph, March 18, 2011.

Figure 14. Writing Centre Anteroom (GH120).

Note. J. P. Ashby, personal photograph, March 18, 2011.
Figure 15. Rotunda GH102 in the morning.

Note. J. P. Ashby, personal photograph, March 18, 2011.

Figure 16. Rotunda GH102 at night.

Note. J. P. Ashby, personal photograph, April 11, 2011.
Figure 17.  *Rotunda GH210 in the morning.*  
*Note.*  J. P. Ashby, personal photograph, April 11, 2011.

Figure 18.  *Rotunda GH210 at night.*  
*Note.*  J. P. Ashby, personal photograph, April 11, 2011.
5.9. Clickz Café

5.9.1. Intention

The purpose of the Clickz Café is to provide PJLC campus members and visitors with access to a food and beverage service. Campus planning anticipated that the implementation of the café would also provide a draw to the PJLC, increasing its frequency and duration of utilization. Generating greater student activity, engagement, and providing a general buzz to the facility were additional motivations. It is the only space allocated in the PJLC providing a food and beverage service (see Appendix I for the Clickz Café space performance evaluation worksheet).

5.9.2. Design

Identified as G168, the café is 75.16 m² and accommodates up to 40 patrons. The space was furnished with approximately 12 café tables and 20 plastic café chairs (see Figure 19). The furniture provided was mobile, allowing campus members the ability to relocate the tables and chairs to the Writing Centre Anteroom for study and dining purposes. The café walls were recently painted green and orange to provide color in the space. There were three very large windows in the space offering access to both natural light and views of the campus green. Window blinds were provided as coverings to allow campus members control the light and temperature of the space. Two of the windows were adjustable allowing for ventilation and airflow. Adjacent to the PJLC’s main entrance was an additional glass door in the space that provided patrons an emergency exit.

5.9.3. Observations

The Clickz Café was observed as a well used space supportive of individual and group study, collaboration, and socializing with others. Serving as an area of convergence, campus members were noted as frequently bumping into one another and connecting to discuss classes, assignments, work-related issues, and upcoming events. Students were observed using this space for periods of 45 minutes or more, and as
result, engaged in a variety of activities. However, it was observed that the majority of the café patrons ordered their food and beverages and took them to other spaces.

During peak periods, the line of patrons waiting to be served extended out the doors of the PJLC. This caused congestion around the entrance and also exposed student services stationed there to a greater volume of noise. Following the wave of a peak period, chairs and tables were disorganized and scattered with dirty tables and debris pushed aside (see Figure 20). During the course of observations, no café staff were observed cleaning table surfaces, discarding debris, or rearranging the tables and chairs to provide greater circulation and use of the space.

Campus members with observable physical disabilities were not observed utilizing the café. This may have been due to the congestion in the space during peak periods. In addition, the frequent movement of furniture and the subsequent bunching of tables and chair in groups often impeded circulation of the space. The environment’s flexibility in furniture arrangement may have given it an element of unpredictability for campus members needing certain spatial requirements in order to freely use and navigate within the area.

When the café’s food services were closed, chairs and tables were stacked and placed against the wall for maintenance to clean the floors (see Figure 21). However, the physical space remained available for students to use as there were no indications or signage stating that campus members could not use the space after hours. However, it was observed that campus members did not frequently use the space after hours nor did students attempt to remove the stacked tables or chairs for their use.

Peak periods of usage occurred Monday through Thursday during the morning and afternoon hours. During the evenings, usage dropped. This may have been due to fewer campus members on university grounds, the closure of additional student services, and the reduction of café food options available. By late afternoon, the food selection had diminished and many items were sold out. On Friday, the services closed at 4:00 p.m. and a drop in area’s usage was noted. This decline in utilization was also observed during the weekend when hours were limited. The café’s services were open
on Saturday until 3:00 p.m. offering full beverage service and donuts but no additional food options. The café was completely closed on Sunday.

The Clickz Café was originally opened in 2008 with set operational hours of Monday through Thursday (8:00 a.m. – 9:00 p.m.), Friday (8:00 a.m. – 5:00 p.m.), and Saturday and Sunday closed. These hours have adjusted to accommodate the increasing demand. The current hours of operation are Monday to Thursday (7:30 a.m. – 9:00 p.m.), Friday (7:30 a.m. – 4:00 p.m.), Saturday (8:00 a.m. – 3:00 p.m.), and closed on Sunday.

5.9.4. Images

Figure 19.  Clickz Café in the morning.

Figure 20.  Clickz Café in the afternoon.


Figure 21.  Clickz Café at night.

5.10. Findings: Evaluation

During the casual observation period, a total of 35 performance evaluations were conducted assessing the technical, functional, and behavioural aspects of each identified zone throughout the day, evening, and night. In addition, 178 photographs were taken capturing the layout, design, and usage of the PJLC. The 35 appraisals were then summarized and each zone was represented with one performance evaluation.

The five zones identified consisted of Group Study Rooms (G170A, G170B, G170C, and G131), the Library’s first floor (G170), the Library’s second floor (G242, G240, and G260), the Rotunda and Writing Centre Anteroom (GH102, GH210, and GH120), and Clickz Café (G168). The data indicated the strengths and weaknesses of each space; furthermore, it was identified how these unique areas supported specific activities through their design, furnishing, and policies governing the space. These evaluations also indicated features that may be compromising the usage of the PJLC.

The performance evaluations contributed to the interviews conducted with UFV Administrators as they demonstrated how administrators actually designed and implemented features in the PJLC to better support academic and social involvement in the setting. Administrators indicated that an objective of the recent renovation was to create a more socially dynamic environment for campus members. The observations of the area post-renovation suggest that the addition of the café, group workspaces, and lounge areas supported greater usage of the PJLC and subsequently increased the potential for interaction and conversation amongst campus members by encouraging students to linger, collaborate, and study in the space.

The evaluations also offer greater analysis of each individual zone and their relationship to one another. This detailed information accounted for the unique physical design of each zone, including how it independently functioned and campus members’ actual use of the space. In addition, the assessments also revealed the intersection between the spaces and how their design, at times, compensated or disrupted the physical design and student activities in surrounding settings. For example, when the café’s seating was full, campus members were observed taking their food and
beverages to the Writing Centre Anteroom or Rotunda. However, as it previously noted the Writing Centre Anteroom was not equipped with a waste receptacle and the Rotunda’s second floor was only supplied with a small bin. This resulted in litter quickly building up in the space and collecting on tables and chairs.

This assessment also revealed the influence that time of day had on the functional and behavioural features of the PJLC. The Rotunda, the café, and the Writing Centre Anteroom altered from spaces that were well utilized during the morning and afternoon hours for studying to nearly vacant of students by the evening. Those campus members who did utilize these specific zones were frequently engaged in activities that differed greatly than those observed during the day. This was most evident on the Rotunda’s first floor where campus members were noted as primarily using the space at night to converse on their cell phones or wait for transportation as opposed to studying.

The evaluations identified technical issues that were observed as influencing the function of the space, such as the lack of artificial lighting illuminating the PJLC. An example of this was noted in the Rotunda. During the day, the area was well lit and occupied by campus members, however at night the usage dropped significantly. Night photographs of the Rotunda document the lack of usage and inadequate illumination in the space (see Figure 16 and Figure 18). Although this technical issue is discussed in greater depths in the Recommendations (see Appendix J), it was observed that night use of the Rotunda increased (see Figure 33) after it was reported to administration that the Rotunda’s illumination was inadequate and that the artificial lighting available was not being utilized.

Over the three month evaluation period, certain campus members were repeatedly documented occupying the same space or study carrel. As an observer of the PJLC, this indicated a user’s preference for a particular space and finite location. It also suggested that there were features about that specific environment that the user perceived as supportive of their learning objectives and activities. A relationship between the learning commons and the student had been forged and the repeated visits and utilization of the space appeared to reinforce this connection.
Lastly, the performance evaluations also raised concerns about the accessibility of the space for campus members with disabilities. The process elicited questions as to the meaning of flexibility and how it is interpreted and designed into a space. For example, administrators interviewed described the importance of implementing “flexible” learning environments for students. However, two of the larger non-formal spaces, the Rotunda’s first and second floor and the library’s second floor, were essentially fixed as they were designed with heavy furnishings and in the case of the Rotunda, the furniture was bolted into the floor or wall. Those spaces perceived as flexible and designed with mobile seating arrangements, such as the café and the library’s first floor, may have also been interpreted as fixed for disabled campus members due to their physical limitations in their ability to modify the space. There were very few spaces allocated and designed specifically for the physically disabled and often during peak periods of usage these limited spaces were utilized by able-bodied students.

Campus members with observable disabilities, such as those wheelchair-bound, were also noted as having difficulty navigating in certain areas of the PJLC. This was apparent in the Rotunda’s second floor due to the narrow walkway provided between the fixed study bar and banister. Students with disabilities were noted utilizing the library’s first and second floor for learning activities. However, wheelchair-bound students were documented as sitting at the end row of study carrels as they appeared to provide the greatest amount of space to navigate a wheelchair, and were not boxed in by additional furnishings.

The demographic of observable physically disabled students comprised .51% of the overall campus members counted for utilizing the PJLC. According to UFV’s Disability Services website, “there are more than 800 students at UFV registered with the Disability Resource Centre” (Information for faculty, n.d.). These disabilities range from visual and hearing impairments to mobility and mental health issues.

5.11. Summary

The analysis conducted provides information as to how the PJLC is currently performing as a learning environment. The space performance evaluations and
photographs illustrate the PJLC’s unique zones designed to provide a variety of settings for campus members to engage in an array of activities supportive of learning. The technical, functional, and behavioural aspects of each zone highlighted its strengths and weaknesses.

The PJLC’s recent renovations have furnished the nooks and crannies of the facility with areas to relax and study. Implementing a café has created a draw to the building and the food service appeared to encourage campus members utilization of the space. However, this new addition has also increased traffic, litter, noise, and disruptions to the PJLC that have required an increase in supervision and maintenance of the facility.

Overall, the PJLC appeared to be successful in engaging and retaining students as well as encouraging and supporting a variety of activities. Those responsible for overseeing the PJLC’s future renovations may want to consider addressing the concerns recognized in this segment in order to provide all students with a comfortable and accessible learning space. The next chapter of the results describes the structured observations conducted in the PJLC, the data gathered, and the behavioural patterns of PJLC users.
6. Results: Structured Observations

6.1. Introduction

The purpose of this chapter is to present the structured observations and place-centred activity maps that illustrate what areas campus members utilized of the PJLC and the activities they were engaged in. The importance of these maps is that they provide planners the “direct links between users in places and physicality and functionality of places themselves” (Marusic & Marusic, 2012, p. 114). The data also identifies campus members’ gender and sociological grouping which offers further insight into gender preferences of learning space as well as collaborative learning preferences. This information addresses the question: What are the patterns of student space usage in the PJLC?

6.2. Chapter Organization

This chapter is organized into two sections. The first section ‘Observations of the PJLC Use’ describes the data analysis, occupants’ activities, and usage of the of the PJLC. The second section on ‘Place-Centred Activity Mapping’ illustrates the structured observational data spatially indicating where students utilized the PJLC and for what activities.

6.3. Observations of PJLC Use

This section pertains to the structured observational data gathered on the PJLC and documented the time, activity, sociological grouping preference, gender, and location of each occupant. Over this 16-day period, the PJLC was structurally observed for a total of 34 hours. On alternating days, the PJLC was observationally swept on the
hour, each hour of operation (7:00 a.m. to 11:30 p.m.), and during each day of operation (Monday through Sunday) for two cycles. The temporal data was then collapsed into morning (7:00 a.m. – 12:00 p.m.), afternoon (1:00 p.m. – 5:00 p.m.), and evening (6:00 p.m. – 11:30 p.m.). This data was entered into an Excel spreadsheet and analyzed through a series of pivot tables. The data was also indicated on the PJLC floor plan and illustrated in PowerPoint as place-centred activity maps.

6.3.1. PJLC Activities and Zones

A coding system was developed during the casual observation period. This coding system is based on the observable activities that students were engaged. Table 3 in chapter 5.3.1 of this dissertation provides a reference to these activity categories and their definitions.

The physical space data was collapsed into five distinct zones that were similar in intention, design, function, and behavioural activities. Creating these zones provided a greater understanding in how environment was functioning as a whole. Table 4 in chapter 5.3.2 of this dissertation defines these zones and their corresponding room numbers.

6.3.2. PJLC and Gender Usage

A total of 1,943 campus members were observed during the structured observational period. Although, UFV’s overall student gender composition is 60% female and 40% male, both genders were observed as using the PJLC equally. Shown in Table 5, 51% of the occupants observed utilizing the PJLC were females and 49% were identified as males.

<table>
<thead>
<tr>
<th></th>
<th>Female (headcount)</th>
<th>Male (headcount)</th>
<th>Female (%)</th>
<th>Male (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>996</td>
<td>947</td>
<td>51</td>
<td>49</td>
</tr>
</tbody>
</table>

Presented in Table 6, females were observed in greater numbers occupying the Clickz Café (58%), Group Study Rooms (56%), and the Library’s first floor (53%). The
design of the Clickz Café, Group Study Rooms, and the Library’s first floor supported greater conversation and flexibility as these spaces could be modified for both individual and group-oriented activities. The policies governing these spaces also permitted the consumption of beverages and food. Males were observed in greater numbers using the Library’s second floor (52%), the Rotunda and Writing Centre Anteroom (52%), and the Library’s first floor (47%). The Library’s second floor and the Rotunda and Writing Centre Anteroom were designed primarily for individual study use and furnished with student study carrels and a study bar with fixed stool seating.

**Table 6. Campus Members’ Location and Gender Usage**

<table>
<thead>
<tr>
<th>Location</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Study Rooms</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Library 1st floor</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>Library 2nd floor</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>Rotunda/Writing Centre Anteroom</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>Clickz Café</td>
<td>58%</td>
<td>42%</td>
</tr>
</tbody>
</table>

### 6.3.3. PJLC and Activity Usage

Over the course of the structured observations, the PJLC members were engaged in a variety of learning activities. As indicated by Table 7, campus members were observed studying (55%), socializing (31%), researching (8%), reading (2%), and consuming food and beverages (1%). Other activities such as sleeping (1%), cell phone usage (1%), and waiting for transportation (1%) were also taken into account. Less than 1% of PJLC users were observed listening to music or viewing videos. Studying and socializing activities dominated all five zones. Studying took place primarily on the Library’s second floor (89%), Clickz Café (45%), and Rotunda and Writing Centre Anteroom (43%). Campus members were observed socializing in the Group Study Rooms (71%), the Clickz Café (50%), and the Rotunda and Writing Centre Anteroom (44%).
The environment’s design, communicated intentions, and policies supported and permitted certain student behaviours. Students utilizing designated Group Study Rooms demonstrated the highest proportion of socializing at 71%. The Library’s first floor, as well as the Rotunda and Writing Centre Anteroom, supported the greatest diversity of student activities including studying, socializing, researching, casual reading, sleeping, using their cell phone (texting or talking), consuming food or beverages, watching videos, and waiting for friends or transportation. This may have been due to the variety of learning resources available, flexible seating arrangements, and policies allowing for socializing and food/beverage consumption.

6.3.4. PJLC and Location

Table 8 indicates the percentage of campus members that utilized the PJLC zones. It was observed that campus members occupied the Library’s second floor (32%), followed by the Library’s first floor (31%), and the Rotunda and Writing Centre Anteroom (20%).

<table>
<thead>
<tr>
<th>Table 8. Campus Members’ Utilization of PJLC Observed Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJLC Zone</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Operational hours of services, policies regarding student use, and access to resources, individually and collectively, have the potential to influence the access and usage of certain spaces. For example, Group Study Rooms were reserved for UFV student use and had to be booked in advanced. The Clickz Café was closed from Saturday afternoon to Monday morning. The Rotunda and Writing Centre Anteroom had no access to computers or books.

6.3.5. PJLC and Time

The PJLC was observed during its operational hours from 7:00 a.m. to 11:30 p.m. These hours were then consolidated into morning (7:00 a.m. – 12:00 p.m.), afternoon (1:00 p.m. – 5:00 p.m.), and evening (6:00 p.m. – 11:30 p.m.). As Table 9 illustrates, greatest usage of the building was recorded during weekdays between the afternoon hours of 1:00 p.m. and 5:00 p.m. Although the PJLC provided a series of learning spaces accessible from 7:00 a.m. to 11:30 p.m., usage of the building appeared to decline when the Clickz Café and student support services such as the Math Centre, Writing Centre, computer lab, and Library were closed.

The Group Study Rooms were observed in greater use during the afternoon and evening hours. The Library’s first floor shows constant usage throughout the day with a slight increase during the afternoon. The Library’s second floor, reserved for silent study, appeared to have the greatest jump of 31% in usage from morning to afternoon hours. The Clickz Café experienced a 16% drop in usage from afternoon to evening hours.

Table 9. Campus Members’ Location by Time of Day

<table>
<thead>
<tr>
<th>Location</th>
<th>Morning</th>
<th>Afternoon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Study Rooms</td>
<td>19%</td>
<td>46%</td>
<td>35%</td>
</tr>
<tr>
<td>Library 1st floor</td>
<td>30%</td>
<td>39%</td>
<td>31%</td>
</tr>
<tr>
<td>Library 2nd floor</td>
<td>15%</td>
<td>46%</td>
<td>39%</td>
</tr>
<tr>
<td>Rotunda/Writing Centre Anteroom</td>
<td>22%</td>
<td>44%</td>
<td>34%</td>
</tr>
<tr>
<td>Clickz Café</td>
<td>32%</td>
<td>42%</td>
<td>28%</td>
</tr>
</tbody>
</table>
6.3.6. **PJLC and Sociological Grouping Preference**

Table 10 indicates that campus members predominantly used the PJLC as individuals (56%), followed by groups of 3 or more (25%), and pairs (19%). Students' ability to work collaboratively appeared dictated by the PJLC design. For example, the Library’s second floor was furnished entirely with fixed individual student carrels limiting group collaboration. Ninety percent (90%) of the students observed in this area were noted using the space as individuals. Areas that were supplied with group tables and several chairs, such as Library's first floor and Clickz Café, were noted as supporting greater collaboration between students.

**Table 10. Campus Members’ Location and Sociological Grouping Preference**

<table>
<thead>
<tr>
<th>Location</th>
<th>Individual</th>
<th>Pair</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Study Rooms</td>
<td>5%</td>
<td>22%</td>
<td>73%</td>
</tr>
<tr>
<td>Library 1st floor</td>
<td>54%</td>
<td>22%</td>
<td>24%</td>
</tr>
<tr>
<td>Library 2nd floor</td>
<td>90%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Rotunda/Writing Centre Anteroom</td>
<td>39%</td>
<td>30%</td>
<td>31%</td>
</tr>
<tr>
<td>Clickz Café</td>
<td>31%</td>
<td>28%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Segregated into zones, the observational data revealed that policies regarding the space also influence individual, pair, and group use. The Group Study Rooms serve as the most supportive space in the collaboration of 3 or more students at 73%, followed by the Clickz Café (41%), and the Rotunda and Writing Centre Anteroom (31%). Although the Rotunda and Writing Centre Anteroom are primarily designed for individual use, campus members were repeatedly observed taking tables and chairs from other spaces to support collaboration. Pairs of students appear to make primary use of the Rotunda and Writing Centre Anteroom (30%), followed by the Clickz Café (28%), and Group Study Rooms and the Library's first floor (both observed at 22%). Individuals predominantly used the Library's second floor at 90%, followed by the Library's first floor at 54%, and the Rotunda and Writing Centre Anteroom at 39%.
6.4. Place-Centred Activity Mapping

The place-centred activity maps provided a contextual reference as to the activities that the PJLC campus members were engaged in. The PJLC floor plans served as a guide during the observational sweeps where campus members’ physical location, activity, gender, and sociological grouping preference were documented. A total of 50 maps were made of the PJLC main and second floor over the building’s operational hours from 7:00 a.m. to 11:30 p.m. Using PowerPoint software, the PJLC floor plans were uploaded and the data was entered.

The 8 place-centred activity maps provided in this chapter illustrate snapshots as to how the PJLC’s main and second floor were utilized during the morning, afternoon, evening and night. The maps include: Thursday, April 7, 2011 at 10:00 a.m. (see Figures 22 and 23), Friday, April 8, 2011 at 2:00 p.m. (see Figures 24 and 25), Thursday, April 21, 2011 at 6:00 p.m. (see Figures 26 and 27), and Sunday, April 10, 2011 at 10:00 p.m. (see Figures 28 and 29). I have selected these maps as they display the PJLC’s usage over 4-hour increments during the course of its normal operational hours.

The maps show that campus members primarily utilized the PJLC’s perimeters for studying and socialization. The common design features that the perimeters shared were their access to windows, transparency, views and vistas, and natural light. The maps also indicated that students observed in the zones were predominantly behaving as the designers of the learning environment had intended. These maps also revealed that campus members were not frequently observed circulating and using the Library’s printed sources such as the magazine, journal, and book stacks. They were observed using the computer terminals for research purposes. The interior of the Library’s first and second floors, dedicated to individual studying and book reserves, were not well utilized. At night, the maps revealed that students tended to work in pairs or groups and often in closer proximity of one another.

The spatial documentation of the PJLC’s usage also elicited questions about the relationship between gender preferences of learning environments and their physical design. Although gender is not represented on the maps, the data indicated that male
campus members were noted as primarily utilizing the areas located around the PJLC’s perimeter. These spaces were identified as the Rotunda second floor (GH210) and the Library’s second floor (G260) and both were designed specifically for individual study. These learning environments provided access to windows, natural light, transparency, and views and vistas. The furnishings were all fixed and supported only individual use.

In contrast, females were documented primarily using more socially supportive spaces, such as the Library’s first floor (G170), Clickz Café (G168), and Group Study Rooms (G131 & G170 A-C). These environments provided group seating for collaboration, encouraged socialization, and offered users the ability to modify the furniture arrangement. Females were also observed primarily utilizing the interior rows of student carrels located on the Library’s second floor (G260). It was noted that these carrels had access to windows, transparency, and were closest to the entrance doors, and exposed to greater foot traffic.
Figure 22. Main Floor Activity Map: Thursday, April 7, 2011 at 10:00 a.m.

Note. Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+1.pdf. © University of the Fraser Valley; used with permission. The morning hours of the PJLC were active with campus members studying primarily in the café, Group Study Rooms, and Rotunda. Social activities were noted primarily in the back of the Library’s 1st floor where the group tables were provided. The library’s computer stations dedicated for research and assignment preparation were well utilized.
Students were observed studying in the Library’s 1st and 3rd rows of the study carrels that were located near windows accessible to natural daylight and campus views. The 2nd row of study carrels located between book stacks were vacant. Campus members noted on the Rotunda’s 2nd floor were engaged in individual and paired study activities.

Legend of PJLC activities and observed zones
- Cell phone
- Consuming food
- Listening to music
- Reading
- Researching
- Sleeping
- Socializing
- Studying
- View Videos
- Waiting

Figure 23. Second Floor Activity Map: Thursday, April 7, 2011 at 10:00 a.m.

Note. Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+2.pdf. © University of the Fraser Valley; used with permission.
Legend of PJLC activities and observed zones

- Cell phone
- Consuming food
- Listening to music
- Reading
- Researching
- Sleeping
- Socializing
- Studying
- View Videos
- Waiting
- GH102-Rotunda & GH120-Writing Centre Anteroom
- G131-Assessment Centre &
  G170 - (A,B,C) - Library group rooms
- G168-Clickz Cafe
- G170- Library 1st floor

**Figure 24. Main Floor Activity Map: Friday, April 8, 2011 at 2:00 p.m.**

**Note.** Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+1.pdf. © University of the Fraser Valley; used with permission. Students were recorded studying in the café, Writing Centre Anteroom, and Rotunda. Socializing was noted in the back of the library and Group Study Rooms. The library’s computer stations were populated with students engaged in research activities.
Figure 25. Second Floor Activity Map: Friday, April 8, 2011 at 2:00 p.m.

Note. Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+2.pdf. © University of the Fraser Valley; used with permission. Campus members were observed utilizing Library’s 1st and 3rd rows of study carrels for studying and socializing. The 2nd row of carrels was not well used and had 5 students engaged in cell phone usage, watching videos, and researching activities. The silent individual study rooms were also noted with students studying.
Figure 26. **Main Floor Activity Map: Thursday, April 21, 2011 at 6:00 p.m.**

*Note.* Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+1.pdf. © University of the Fraser Valley; used with permission. Activities observed in the evening included: studying, socializing, listening to music, cell phone usage, and consuming food and beverages. Researching and socializing were primarily observed in the Library’s 1st floor and Group Study Rooms. Although student services were closed, the café was open for service.
The Library’s 2nd floor, furnished with 3 rows of study carrels, were populated with students studying. The silent study rooms G240 and G242 were also in use. Students utilizing the Rotunda’s 2nd floor were recorded as socializing and studying.
Figure 28.  **Main Floor Activity Map: Sunday, April 10, 2011 at 10:00 p.m.**

*Note.* Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+1.pdf. © University of the Fraser Valley; used with permission. Utilization of the PJLC dropped significantly after 10:00 p.m. at night as all student services, including the library and café. Studying activities were noted in the most well lit areas including the café and Assessment Centre.
Figure 29.  Second Floor Activity Map: Sunday, April 10, 2011 at 10:00 p.m.

Note.  Figure adapted from UFV Operations website, Retrieved on February 1, 2011, from http://www.ufv.ca/Assets/Facilities/Floor+Plans/PDFs/G+Level+2.pdf. © University of the Fraser Valley; used with permission. Campus members were observed utilizing the Rotunda’s 2nd floor for socializing and studying activities. Students were noted studying in well-lit areas and socializing in poorly illuminated areas. The library, café, and student services were closed.
6.5. Findings

The structured observational data gathered indicated that there were preferences and patterns as to the usage of the PJLC. Of the 1,943 campus members observed utilizing the space, 51% were female and 49% were male. The most well used areas of the PJLC appeared to be the Library’s first and second floor for studying and socializing during weekday afternoons between 1:00 p.m. and 5:00 p.m. Campus members were documented mainly using the PJLC as individuals followed by groups of three or more. It was observed that females made primary use of areas that supported conversation through policy and design, such as the Clickz Café and Group Study Rooms. Males were documented utilizing spaces designed for individual use such as the Library’s second floor and the Rotunda and Writing Centre Anteroom.

The physical design, operational hours, and policies were observed as dictating campus members’ activities, frequency, and duration that the space was used. Settings, such as the Group Study Rooms, that were physically and operationally supportive of collaboration indicated greater socializing. Zones that were well lit, furnished with technological support, supervised by staff, and provided ample seating, such as the Library’s first floor and Clickz Café, appeared to positively influence and increase the length of time students spent in the setting. Learning spaces, such as the Rotunda’s first floor, that provided fixed furnishings designed for individual use, was observed as more transient space for campus members.

The generated maps also provided additional information as to the preferences of campus members in their desire to sit in areas furnished with windows that provided access to natural light, views, and vistas. Learning areas of the PJLC that were observed as not well utilized by campus members included the Writing Centre Anteroom, the Library’s second floor individual study rooms (G240 & G242) and its second row of study carrels. These environments were insulated within the PJLC and had no access to windows or natural light.
6.5.1. Summary

Based on the observations made of the PJLC and its 5 identified zones, students activities were congruent with Administration’s intentions. Areas designated for socialization and collaboration, such as the Group Study Rooms, were primarily used for group work. The Library’s second floor, intended and designed for quiet individual study and research, was also identified as an environment that encouraged autonomous learning activities. However, the Clickz Café seating area, intended to serve patrons consuming food and beverages and learning activities, was observed as mainly supporting campus members involved in collaborative studying and socializing. During the night, the PJLC dropped in utilization as many of the student services were closed. In addition, certain zones functioned differently in the evening to support other activities. For example, during the day the Rotunda was used for studying purposes and at night functioned as an area for students to wait for rides, public transportation, and use their cell phone.

To encourage usage of the PJLC throughout the majority of its operational hours, administration may want to consider extending the café and student services hours to into the evening. Increasing the PJLC’s lighting and brightness in the evening would also support learning activities such as studying. In addition, the PJLC may serve faculty looking for an alternative space for learning activities during their evening classes. UFV’s Supported Learning Group project may also benefit from the PJLC’s evening drop in usage by utilizing the café seating area as a place to convene for tutoring.

The following chapter of this study provides the discussion. This segment explains and interprets the results provided in chapters 4, 5, and 6. In addition, this concluding chapter evaluates the strengths and weakness of the investigation undertaken and provides recommendations for further research conducted in learning environments.
7. Discussion

7.1. Introduction

This study investigates how campus administrators involved in the Peter Jones Learning Commons (PJLC) design process perceive student learning in non-formal learning space and describes how these perceptions are interpreted through the planning, design, and operation of the PJLC. Furthermore, this study examined the outcomes of these design decisions through interviewing students and observing the behaviour of campus members utilizing the PJLC non-formal learning environment. This research informs the continued evolution of the PJLC in meeting students’ learning needs in addition to contributing to the advancement of literature pertaining to the future design and development of multi-functional educational facilities such as learning commons.

One of the gaps of learning environment literature is its failure to take into account the physical and ergonomic features of the space, focusing on students’ and teachers’ perceptions of the ambience or atmosphere of the setting. The literature also concentrates primarily on the classroom as opposed to surrounding spaces essential for students’ self-directed, autonomous and collaborative learning activities. This study contributes to learning environment research by addressing: 1) administrators’ perspectives and process in designing non-formal learning space, 2) the complexity in developing and sustaining multi-functional educational facilities such as learning commons, 3) students’ perceptions, needs, and actual usage of non-formal learning space.

Chapter 2 of my study addresses the current literature and research conducted in learning environment theory. Researchers and practitioners, such as Jamieson (2000), Oblinger (2006), Strange and Banning (2001), and Temple (2007) emphasize the need to study post-secondary non-formal learning environments to understand how they
contribute and support students’ educational experience. The methodological approach of this study, described in chapter 3, provides a brief historical background to the post-occupancy evaluation, in addition to explaining the use of this multiple method instrument as a vehicle in advancing occupant satisfaction and the environmental design of learning spaces. For this study, the methodology consisted of interviewing administrators and students, conducting casual and structured observations, performing a space performance evaluation of the facility, and developing place-centred activity maps.

The results of the study are detailed in chapters 4, 5, and 6. Chapter 4 describes the findings of the interviews conducted with UFV Administrators on their perceptions and observations of student learning and how they influence the PJLC planning and design. This chapter also explains the experiences and observations of learners who have utilized the PJLC pre- and post-renovation. Chapter 5 details the space performance evaluation conducted on each of the PJLC’s five zones identified in the study. The evaluation details the relationship between the technical, functional, and behavioural characteristics of each unique space. Chapter 6 presents the structured observational data gathered on campus members’ activity and usage of the PJLC. This data is depicted in a series of tables and place-centred activity maps in order to illustrate the spatial relationship between users, activities, and the PJLC design.

7.2. Chapter Organization

The Discussion begins with an ‘Interpretation of the Results’ explaining how this research relates to previous work conducted in the field. The next section on ‘Results: Significance and Wider Implications’ describes how the study contributes to the literature and empirical research on learning environments. This is followed by ‘Revisions to the Study’ that pertains to a modification of the study that occurred during its initial stages. ‘Suggestions for Improvements’ highlights the areas of the investigation that may help to guide future researchers interested in conducting similar studies. The final segment ‘Recommendations for Future Research’ suggests directions for future research in the study of non-formal learning environments.
7.3. Interpretation of the Results

7.3.1. Paradigm Shift: Autonomous Learning to Student Engagement

As this study indicates, several unanticipated challenges have been posed in altering this facility’s original built intentions and reprogramming the space to adopt a new set of objectives. The transition of a building that supports autonomous learning activities to one that encourages socialization and collaboration has, at certain junctures, been difficult to realize.

The PJLC evolution from an information repository and a place of expertise to a socially dynamic and engaging space is not uncommon (Hussong-Christian, Rempel, & Deitering, 2010; Lippincott, 2004). Bennett (2009) describes that the influence of information technology has been instrumental in the library’s paradigm shift from a place where information is sought to an environment that is learner-centred. He explains that library space has had to academically and physically accommodate for this new digital age and forge new relationships with information technologists. For many libraries, areas once dedicated to books and reserves have now been replaced with computers, group study rooms, and cafés (Bennett, 2009, p. 9).

Libraries, as Bennett (2009) continues, are at a pivotal point in their transition and now need to be focused on encouraging intentional learning. However, he highlights that the culture of learning within library space is not well known or understood by those responsible for the planning and design of library spaces. Bennett (2009) describes:

If we want to make learning happen in libraries, then understanding learning processes and applying that understanding systematically to our planning and design work is the key to further advance. To do this, we must think more like educators and less like service providers. We must build an understanding of how people learn, consider the pivotal role of intentional learning in that process, and—most critically—choose to enact the learning mission of our institutions rather than simply support it. (p. 11)
Understanding the institution’s culture of student learning is critical in providing an environment that supports and encourages behaviours that result in the acquisition of knowledge, however just as vital is our comprehension as to how these educational structures evolve and respond to physical changes. In his book *How Buildings Learn*, Brand (1995) stresses that the adaptability of a building is critical in its sustainability and ability to continue to serve the changing needs of its occupants. Universities undergoing a revitalization process to encourage new learning behaviours need to consider assessing the space pre-design and determine how the environment is being used, the activities it supports, and the stakeholders that may be impacted by its changes (Hussong-Christian et al.; Shen, Shen, & Xiaoling, 2012). Furthermore, establishing a series of measurable learning objectives for the proposed setting helps to guide the space programming, planning, and design of the facility (Bennett, 2009; Warger & Dobbin, 2009). These objectives would also support the post-analysis of the space in order to determine if the environment is achieving its learning intentions (Warger & Dobbin, 2009). Developing a design cycle of evaluation provides campus administration with information regarding their unique student demographic and the structures that best guide and support their learning activities.

7.3.2. A Multi-Faceted Approach

The interview and observational data gathered in this study indicate that the design of non-formal learning space requires a multi-faceted approach to appeal to its users. Interviews with UFV Administrators and students intersect on issues such as the importance of implementing flexible spaces for users to adapt to their learning needs and preferences; in addition to suggesting that the space should provide comfort. Supplying students with the most current forms of technology in their learning space was also stressed.

Students and administrators converged on the need for implementing spaces that support greater collaboration and student engagement. The literature and research conducted in the development and design of non-formal learning environments also promote these ideas of flexibility; comfort and aesthetics; technological resources and support; and collaboration as trends in the design of learning spaces (Hunley & Schaller, 2006; Jamieson, 2003; Reynolds, 2007; Temple 2007). The importance of
environmental factors in learning is emphasized in Zandvliet and Straker’s (2001) assessment of physical and psychosocial features of IT classrooms. As the authors explain, “the provision of adequate working environments for students is more than a comfort or safety issue but rather also a learning issue in that an inadequate physical learning environment might affect psychosocial disharmony perhaps disrupting or distracting the intended learning goals” (Zandvliet & Straker, 2001, p. 9).

**Flexibility**

During the administrator-interviews, the word flexibility was used repeatedly. Monahan (2002) subdivides the flexibility of educational space as versatility, scaleability, fluidity, convertibility, and modifiability. Learning environment research defines the versatility of a space as one that can easily transform to changing pedagogical and learning needs (Chism, 2006; Jamieson, 2003; Temple, 2007). Administrator-interviews also used flexibility in reference to the PJLC’s scaleability in that the recent renovation required the expansion and contraction of certain student services and study space (Monahan).

Administrator-interviews also applied flexibility when discussing the fluidity of these newly created spaces in the PJLC issues with the flow of individuals and sound into other surrounding spaces. The convertability of the PJLC was also highlighted by administrators as the facility was originally built to provide campus planning with the future option of building a third floor. Student-interviews describe flexibility as the modifiability of their space, permitting them to reconfigure their surroundings to engage with each other and accommodate their learning preferences (Chism, 2006; Jamieson, 2003; Monahan, 2002; Temple, 2007).

**Comfort**

Chism (2006) notes that the discomfort experienced by a student “makes a compelling distraction to learning.” A comfortable environment was paramount for students and UFV Administrators interviewed. During this study, participants indicated that comfort embodied the physiological aspects of the space, such as thermal, visual, and acoustic features; however they also described comfort in relation to the
behavioural, contextual, psychological, and social atmosphere of the setting (Cole et al., 2008).

Learning environment research primarily defines comfort as physiological and identifies issues such temperature, illumination, and level of distractions as influential in students’ comfort and their use of learning space (Chism, 2006; Jamieson, 2003; Temple et al., 2007). UFV Administrators and students also described comfort in the context of the PJLC’s furnishings. Chism (2006) describes that providing students with furniture, particularly chairs, that are comfortable and adjustable to varying body types is important in encouraging student use of the environment (Chism, 2006). As was indicated during the interviews with administrators, providing non-formal learning spaces reflective of a student’s home environment with couches, natural light, and neutral wall colors were intended to encourage use and comfort. Administrators relaxation of food and beverage consumption in learning spaces was another strategy to accommodate students’ needs and support longer use of the setting.

**Technological Resources and Support**

Cox and Jantti’s (2012) recent study found that students who spent up to one hour a year accessing the library’s electronic resources had higher marks as opposed to those students who never used the library’s system. It is through these types of studies that we are learning about the impact students’ use of technology is having on students’ learning outcomes and success. As found in this study, UFV students stated that their ability to complete assignments, conduct research, gather learning resources, and communicate with faculty was heavily influenced by their access to technology. Furthermore, the structured observations indicated that students heavily utilized the PJLC’s zones dedicated to computer use and designated for assignments and research.

The use of technology and ability to access learning resources online has increased the demands on the physical space to provide and support the latest technology (Chism, 2006; Jamieson, 2003; Oblinger, 2006; Temple, 2007). Rooms outfitted with technology, often referred to as “smart rooms,” are in demand by students, as they provide instantaneous access to information, learning materials, and virtual connections with others (Cunningham & Tabur, 2012). The successful delivery of technology to learning environments relies on resources and support, such as access to
experts knowledgeable in setup and implementation and equipment, such as electrical outlets, projector screens, and monitors. Furnishings in these spaces also require mobility and flexibility in order to adapt and physically position learners to utilize these resources. As witnessed during the observations of this study, electrical outlets behaved like black holes attracting students and furniture to them. This resulted in furniture disrupting members’ circulation and access of the space. Chism (2006) recommends “Rather than cumbersome rack systems and fixed ceiling-mounted projectors, learning spaces of the future will need more flexible plug-and-play capabilities” (p. 2.7).

Collaborative and Individual Study Spaces

To encourage greater collaboration in the PJLC and support the pedagogical swing towards group work, UFV Administrators modified the PJLC Library’s first floor from quiet individual study to group study. Administrator-interviews explained that they observed students inclination to want to work around one another even in silent spaces. As a result, study carrels were replaced with group tables outfitted with electrical outlets and mobile seating. Soft lounge seating and couches were also provided. Space and furnishings can enhance collaboration and communication and are important components in encouraging the flow and exchange of dialogue (Chism, 2006; Jamieson, 2003; Oblinger, 2006; Temple, 2007). Furthermore, the style of furnishings and their layout also influence students’ ability to work with one another and to connect visually with others in the space (Herman Miller, 2005, 2007).

Cunningham and Tabur (2012) also support this finding of students’ inclination to want to study around others but cite that administration is overemphasizing this trend to convert individual learning space to group study space. The authors explain that, “Students consistently design ideal spaces with quiet areas and indicate noise dampening features. The desire for quiet, contemplative study is as strong as ever and a common student complaint often involved the lack of quiet space within the library” (Cunningham & Tabur, 2012, p. 2). Cunningham and Tabur suggest preserving the quiet individual spaces and creating both communal and social learning spaces to accommodate students that would like to work quietly with others and those that want to engage in a dialogue. The need to maintain and preserve silent study space was also evident in the interviews conducted with UFV students. Students emphasized the
importance of having access to an environment void of audible distractions. In addition, administrators stated that they had noticed an increase in usage of the Library’s 2nd floor space that is dedicated to silent study. Furthermore, the structured observations documented the Library’s 2nd floor as the space most utilized by students for studying purposes.

7.3.3. Student Usage and Activity Patterns

Administrators’ perceptions of student learning in non-formal learning space as social, technologically supported, and multitask-oriented are not uncommon (Cunningham & Tabur, 2012). Cunningham and Tabur’s (2012) review of the literature on the design of library space, found that this current generation of students are noted for their “ability to multitask” (p. 2). UFV students’ perceptions of the pedagogical shift from individual to collaborative work was also supported by the authors who describe students’ increasing need to locate spaces to support group assignments (Cunningham & Tabur, 2012). In his study evaluating student activities in library space, Suarez (2007) also found “socializing behaviours” as “very prevalent” and commented that students were often engaged in utilizing technology and involved in multiple activities including studying, socializing, and consuming food and beverages while utilizing the space.

Environmental factors that appeared to influence usage of the PJLC, such as lighting, noise, and temperature, is supported in the research (Cunningham & Tabur, 2012). The authors indicate that “Student preference is for abundant natural light with a decided aversion to fluorescent lighting” (Cunningham & Tabur, 2012, p. 4). Similarly, Suarez (2007) also found that lighting, noise, and temperature impacted students’ use of non-formal learning space. In his study on library space, Suarez (2007) notes that the brighter lit spaces appeared to have more alert students utilizing them as opposed to the dimly lit spaces that were observed with students napping. Suarez also describes that ambient noise was tolerated in library space though loud and disruptive noise was not. Students were observed departing the space when noise began distracting them from their tasks. Temperature was another factor that Suarez (2007) identifies as influencing students’ comfort in the usage of library space. Students characterized spaces that were perceived as too warm or fluctuated in temperature as uncomfortable (Suarez, 2007).
During the observational period of this study it was noted that the PJLC was a well-utilized facility that equally attracted and retained both genders. This was an interesting finding, given that at the time of this study UFV’s current student population consisted of 60% female and 40% male. The overrepresentation of males in library usage was also noted in Applegate’s (2009) study evaluating student usage of library space at Indiana University Purdue University Indianapolis. She also found that “men were distinctly overrepresented as library users, relative to their presence on campus” as they comprised “42% of the students on campus but 53% of University Library users” (Applegate, 2009, p. 343).

During this study, male campus members were documented utilizing the PJLC spaces that were primarily designed for quiet, individual use. These areas also were noted for their fixed furnishings, access to natural light, and elevation on the second floor of the PJLC. Although Applegate (2009) cites that there was no notable gender pattern of usage in her study on library space, she did identify that males outnumbered females in their utilization of the “soft chair” area that was described as secluded and individually oriented (p. 343).

However, understanding gender preferences and their selection and use of non-formal learning spaces is not widely discussed or investigated in learning environment research even though differences in gender perceptions of facilities have been identified in the literature. Bennett and Benton’s (2001) study assessed the perceptions of students regarding campus architecture. Participants (n=301) were questioned on a series of pictures depicting a variety of campus buildings located throughout the United States. The authors found that students assigned individual success with modern architecture versus traditional architecture and that, overall, males’ perceptions of individual success were not as influenced by the architectural styles as opposed to female participants (Bennett & Benton).

Furthermore, Reynolds (2007) surveyed 46 US and Canadian private and public post-secondary institutions on the influence campus facilities had on student recruitment and retention. With 16,153 student responses, results of his survey revealed significant differences between genders and how influential the condition and state of facilities were in students’ decision to attend the institution. Women were identified as rejecting an
institution more frequently than men due to poor maintenance or inadequate facilities and open spaces. Men indicated a higher rejection towards institutions that did not have adequate support for technology, computer lab facilities, and research labs. It was also noted that the top three facilities specified as the most influential in students’ decision to attend an institution were facilities in their major, the library, and technology.

During the planning and development of educational structures, administration should consider the impact that environmental characteristics and building design have in students’ perceptions, preferences, and selection of learning space. Designing facilities that encourage and engage both genders is vital given the current challenges Canadian and U.S. universities face regarding the decline of enrolment, retention, persistence, and completion of male college students (Sax, 2008; Statistics Canada, 2009).

7.3.4. **Inclusive Learning Environments**

During this study, I observed physical challenges and barriers that appeared to hinder disabled campus members utilization the PJLC’s non-formal learning space. Learning environment research and literature interprets, defines, and illustrates the *accessibility* and *flexibility* of educational space primarily through the lens of an able-bodied user. During this study, it was observed that the PJLC’s furnishings and layout were problematic for physically disabled students even though administrators perceived their design as flexible for users. For example, tables and chairs on wheels may be perceived as flexible and modifiable to the able-bodied user but fixed from the perspective of someone who has limited use of their arms or body’s leverage. Fixed furniture environments may actually provide greater safety and comfort for disabled students as the furniture is not mobile and their circulation and movement about the space is not subject to change while they are using it.

As it was noted during this study, wheelchair-bound students’ selection of non-formal learning spaces was limited as were their access to features related to environmental control. It was also observed that wheelchair-bound students had limited or no access to features such as artificial and natural light, window coverings, furniture, wheelchair ramps, and space to circulate and navigate a wheelchair. Addressing
physically disabled students’ access and use of learning space during the initial planning and design phase of educational structures are essential. The inclusion of disabled campus members as part of the planning and policy development of space provides another important perspective and vantage point to the design and access of learning facilities (Haller, 2006).

Technologically, access to electrical outlets appeared limited for those wheelchair-disabled campus members. Outlets located in the Group Study Rooms, Writing Centre Anteroom, and the café were near ground level. The majority of the Rotunda’s outlets were located on the study bar. However, the Library’s first floor and second floor did provide study carrels and group tables that were equipped with outlets for those seated there.

The lack of physically supportive spaces for disabled students is also identified in the literature (Chism & Bickford, 2002; Oblinger, 2006; Strange & Banning, 2000). Chism and Bickford (2002) describe that one of the “assumptions” made when designing space for learners includes that they are able-bodied students. Oblinger (2006) notes that these assumptions regarding who is utilizing the space need to change in order to provide learning environments that are supportive and inclusive for all students wanting to engage in learning activities. Fichten, Asuncion, Barile, Robillard, Fossey, & Lamb (2003) cite that in Canada, “11% of Canadians with disabilities graduated from university. The comparable figure for nondisabled Canadians is 20%, almost double the rate for Canadians with disabilities” (p. 74). Oblinger (2005) identifies in “The National Learning Infrastructure Initiative” “that approximately 10% of college and university students have some form of disability.” In response, she suggests implementing policies that emphasize physical accessibility for disabled students and emphasizes their importance in the design of learning spaces.

7.4. Results: Significance and Wider Implications

The findings of this study provide UFV with information regarding the perceptions and usage of their largest facility dedicated to non-formal, self-directed learning space. It also offers insight as to the perceptions, observations, and challenges university
administrators have regarding the evolving dynamics of student behaviour in non-formal learning spaces. This information may assist them in the future development and design of the PJLC and surrounding facilities that are planned to incorporate similar features.

On a broader scale, this work contributes to the literature on the campus learning commons. Research conducted on occupants’ experiences using multi-functional facilities is emerging as the nature of the library transitions into a more socially collaborative and technologically enhanced space. The dynamics of these learning environments are unique as their planning is informed by a diversity of user groups and their learning objectives are intended to serve a diversity of needs. This research adds to this dialogue by presenting the evolutionary process of PJLC and how this building has adapted over the years to accommodate the learning needs of future generations.

This study did not concentrate on the PJLC’s energy efficiency; however, the results and findings did elicit information that may contribute to the building’s sustainability and reduction of its' ecological footprint. For many institutions, sustainability within the campus milieu is primarily focused on recycling efforts, facility’s Leadership in Energy and Environmental Design (LEED) accreditation, and energy consumption. The concept of a sustainable building is transitioning as there is a growing movement challenging the definition and application of sustainability. Sustainability, in this new paradigm, determines the success of a green building based on its ability to educate and modify occupants’ behaviour towards becoming more energy conscious (European Commission, 2012). Although the PJLC is not LEED certified, the environment can still promote and educate users to behave with greater ecological sensitivity.

Utilizing the post-occupancy evaluation and conducting performance analyses on campus space provide vital information to campus planners regarding the environment’s frequency and duration of use, in addition to understanding what activities users are engaged in, and their overall satisfaction with the space. These insights further contribute to creating a more sustainable space in that they inform administrators about the institution’s unique learning culture and the structures most suited to supporting it. Furthermore, this work is significant because it experiments with the use of the post-occupancy evaluation in assessing planning process and users’ experiences of a post-
secondary facility. The literature and research emanating from the post-secondary sector indicates that higher education has not invested the attention and resources into studying the environmental influence that facilities have on student experience, perceptions, and learning (Amedeo et al., 2009). This study considers the context and importance that this learning commons has in supporting students’ learning experience outside the classroom.

Finally, the scholarly significance of this study is not only in the findings of the research and analysis of the PJLC, but more importantly in the questions the study raises and how the results of similar studies will continue to shape our learning experience. Little is known about the behaviours of students outside of the classroom and the spaces they seek to learn in. As institutions venture into designing learning commons, there appears to be a fine line between providing a quiet, studious environment and one that is socially dynamic and engaging. The question to be posed is whether the concept of the commons will continue to support the learner, or whether this type of space is shifting to a model where recruitment and retention of students will rely on marketing strategies that promote the appeal to socialization and entertainment, thereby eschewing the original intent of these spaces — and how this shift will redefine a school's mission of delivering a quality education (Cox, 2011; Hancock & Spicer, 2011).

7.5. Revisions to the Study

The initial proposal of this study requested access to the results of UFV’s National Survey of Student Engagement (NSSE) conducted in 2010. Although the survey does not specifically pertain to students’ perceptions and usage of the PJLC, the data would have provided additional information regarding students’ satisfaction with the campus’s physical environment. Conflicting information as to whether or not the data would be accessible ensued and after repeated requests access to the data was denied. However, UFV did submit a limited sample of their NSSE results to the Canadian magazine Macleans for their university rankings publication. Macleans Magazine provided a brief comparison between universities participating in the survey that was available for review.
7.6. Suggestions for Improvements

Over the course of conducting the study and exercising the methodology in this study setting, areas for improvement were noted. Sommer and Sommer (1997) suggest that studies using observational methods employ two recorders to assist in documenting behaviours. Had funding for the study been available, an additional recorder would have been employed to help in conducting the observational sweeps. This would have provided another source to compare and verify the perceptions, observations, and data collection of students’ behaviours.

The place-centred activity mapping data was extensive and time consuming to process by hand. Access to software designed to visually illustrate, depict, and collapse the place-centred activity mapping data would have conserved time and expedited the analysis. A researcher interested in conducting a detailed study using observational methods should consider learning and investing in a software program that are developed for this technique.

7.7. Recommendations for Future Research

Those interested in pursuing research in learning environments should consider investigating gender preferences of learning space; integrated planning and research; environmental assessments as part of the design process; and the development of inclusive learning environments. The findings presented in this study indicate that there may be gender preferences as to the design and usage of the various learning spaces studied. In addition, several universities are transitioning towards an integrated planning approach and are requiring new ways to manipulate and intersect their facilities and student data. Although the post-occupancy evaluation has been in existence for at least fifty years, it has not been widely implemented as part of the assessment in the design process. Furthermore, the design and implementation of inclusive learning spaces and the environmental needs of impaired users is not well understood. This segment describes these areas of interest in greater detail.
7.7.1. Gender Preferences

The data gathered and literature reviewed during this study suggest that gender may influence the preference for certain environmental and design characteristics of learning spaces. As institutions and their academic departments create programs designed for particular demographics, they may want to consider designing a context that takes into consideration the particular environmental needs of the demographic and discipline that they are serving.

It was observed during this study that gender may also influence the type of learning space desired. This study found that males utilized learning space primarily designed for individual use. These areas also were noted for their fixed furnishings, access to windows and natural light, and elevation and views of the surrounding campus milieu. Females were observed utilizing areas of the PJLC that were supportive of social and collaborative learning activities. These spaces were also described as providing a flexible furniture arrangement, accommodating for both individual and group study. Investigating the factors that influence male and female students in their selection and usage of learning environments is an area worthy of further inquiry.

7.7.2. Integrated Planning and Research

Advancements in technology have allowed researchers and practitioners in the disciplines of education, campus planning, and environmental design access to powerful tools and instruments that are able to gather, track, analyze, and visualize the mass of data being collected and housed within university departments such as Institutional Research, Campus Planning, and Facilities Management. However, for many institutions, the databases that house facilities and student-related data are not integrated (Watt, 2007). Developing a database that provides a rich description of room characteristics correlated with student attendance, grades, and course completion may lead to a greater understanding between the physical features of a space and academic achievement.

In addition, overlapping this information with budgetary data on campus facilities may also provide further insight regarding the relationship between where resources are being invested in the campus’s infrastructure and users’ behavioural outcomes
associated with facility’s renewal projects. Furthermore, this information may also help to identify the physical areas on campus that are under-resourced, neglected, and inadequately used as well as inform facility projects in development. Research in the intersection of these databases is suggested to assist administration in integrating their university planning and initiate the examination of the campus’s structural and student performance relationship.

Finally, I would suggest that university administrations and campus planning departments consider developing an audit trail of their campus’s physical changes. An audit trail includes the data, rationale, objectives, meeting minutes, negotiations, and plans regarding space change. Creating an audit trail benefits those interested in assessing the performance of the setting and its intended goals. In addition, the process of modifying a space often includes a series of negotiations and transactions between those wanting to repurpose the environment and those invested in the setting’s current state. The audit trail can serve as reference to the bargaining that occurred during the physical shift and the agreements made between each party. This record also assists administration in its consistent communication and response to the campus community regarding concerns over space modifications.

7.7.3. Building in Assessment

The literature review and research conducted in this study indicates that campus administrations use a variety of informal and formal instruments to assess campus facilities and their perceived success in meeting the user’s needs and university objectives. However, administrators interviewed during this study revealed that the renovations conducted on the PJLC were done without an evaluative component built into the process. As described by this study’s literature review, evaluation of a facility’s performance post-renovation is not commonly addressed.

Further research as to why pre- and post- occupancy evaluation has not become a standard in campus renewal and development projects should be investigated and better understood. Conducting interviews with campus planners at a variety of universities may offer insight as to how to approach, budget for, and integrate tools such as the post-occupancy evaluation, as well as a more discrete space performance
evaluation, into campus planning process. Also implementing an impact assessment to screen and scope the environmental, social, financial, and policy impact of a proposed project may help to clarify potential issues with a facility’s design. This is particularly important in light of the efforts made to reduce buildings’ costs and bolster campus sustainability and energy efficiency.

7.7.4. Inclusive Learning Environments

Building inclusive learning environments that support both able and disabled users is an important but often overlooked feature confronting the design of non-formal learning spaces. Including campus members with disabilities as part of the space planning dialogue is essential in understanding the perspective and physical vantage point that these learners experience the environment. However, limited research has been conducted in this area to better understand the perceptions, behaviours, and unique physical needs of students utilizing the campus (Haller, 2006).

Therefore, it is recommended that inclusive learning environments be further explored in order to spearhead the dialogue on how to best support the diversity of students attending and learning on campuses. In addition, this may also help to inform and educate campus planning as to how they interpret and define the flexibility and versatility of a space. Furthermore, space performance evaluations should incorporate guidelines in assessing disabled members’ access to environmental control features, safety elements such as emergency phones and access to exits, layout of furniture, and circulation of the space.

7.8. Conclusion

The aim of this study is to understand the cycle of design beginning with administrators’ observations of student learning in a non-formal learning context and then to determine how those perceptions have translated into the PJLC’s environmental design. The cycle concludes with students’ feedback as to their preferences, experience, and usage of the PJLC post-renovation. As was indicated in the study, the PJLC has experienced a series of transformations since its inception in 1995. The
dynamics of a younger demographic, the infusion of technology, and a paradigm shift in institutional mission have influenced the design and programming of the PJLC. Administrators involved in the recent revitalization of the PJLC cite the challenges of meeting the changing needs and environmental expectations of today’s students.

Results indicate that there are social and behavioural patterns students have established in using the PJLC. These patterns appear to be influenced by time of day, environmental design, and the operational hours of services. Additionally, these patterns raise questions regarding gender and age preferences pertaining to the types of learning environments that are most supportive during their studies.

Major changes to the facility, including the addition of a popular retail vendor to the building, has increased campus member’s usage of the space and consequently altered the dynamics of the PJLC. Administration voiced several challenges regarding the PJLC’s increasingly social atmosphere and the concerns expressed by university staff attempting to deliver learning services and work in the environment without disruption. When space on campus is at a premium, questions regarding how to best align space planning with academic and learning objectives naturally arise.

Universities undergoing the renewal and development of their campuses need to consider the influences that these changes may have on both the immediate space and the surrounding areas. Architect Christopher Alexander poignantly states, “When you build a thing you can not build that thing in isolation, but must also repair the world around it, and within it, so that the larger world at that one place becomes more coherent, and more whole” (Alexander, et al., 1977, p. xiii). Designing, implementing, and sustaining the campus’s learning environment requires institutions to examine formal and non-formal space as not merely something static, and maintained, but as dynamic and evolving, requiring systematic review and adaptation in order to continue to optimally serve its intended purpose (Stigall, 2007).
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Appendices
Appendix A.

Administrative Interview Questionnaire

Below are the questions that guided the interviews with Administration regarding their perceptions of student learning and the planning and design of UFV’s PJLC.

Purpose of the interview: The purpose of this interview is to gain a better understanding of the decisions and processes undertaken in designing learning environments for students. In addition, the content of this interview will contribute to the assessment of how the Learning Centre supports student engagement and learning needs. Content of this interview will be used to inform the findings and conclusion of this project.

Terms of confidentiality: As detailed on the attached consent form.

Format of the interview: The interview will take approximately 60 minutes and with your permission be recorded for the purposes of being transcribed.

1. How long do you spend in the Learning Centre during the day?
2. How would you define the ideal learning space?
3. Do you feel that learning needs have changed for today’s students? If so, how?
4. How do you determine what spaces are effective in supporting student learning?
5. What learning theories and practices inform how you design and program space in the Learning Centre?
6. What was the impetus behind the renovation of the Learning Centre?
7. What process was undertaken to determine how the space would be designed, programmed, and used?
8. How effective was the process from inception to completion?
9. Did you apply learning objectives to the space? If so, how did they evolve?
10. Did you develop a plan as to how those learning objectives would be measured following the renovation?
11. How has the renovation to the Learning Centre fulfilled or not fulfilled those objectives and how have you determined that success or failure?
12. What behavioural changes have you observed since renovating the environment?
13. What specific changes to the space do you feel created the greatest impact in terms of how the Learning Centre now functions?
14. Since the renovations, what do you think students value most about the Learning Centre?
15. Based on your observations, how are students now using the Centre to engage in learning?
16. What environmental/programming/structural modifications would you make in the future? How do you think the building will respond to these future changes?
17. Would you like to add anything else regarding your process in designing, developing and programming space within the Learning Centre?
18. Do you have any further suggestions regarding topics that should be discussed on this matter?
Appendix B.

Student Interview Questionnaire

Below are the questions that guided the interviews with students regarding their perceptions of student learning and the planning and design of UFV’s PJLC.

**Purpose of the interview:** The purpose of this interview is to gain a better understanding of the decisions and processes undertaken in designing learning environments for students. In addition, the content of this interview will contribute to the assessment of how the Learning Centre supports student engagement and learning needs. Content of this interview will be used to inform the findings and conclusion of this project.

**Terms of confidentiality:** As detailed on the attached consent form.

**Format of the interview:** The interview will take approximately 60 minutes and with your permission be recorded for the purposes of being transcribed.

1. How long do you spend in the Learning Centre during the day?
2. How would you define the ideal learning space?
3. What are the learning needs for today’s students? As a student, do you feel that these needs have changed over the course of your studies? If so, how?
4. Where in the Learning Centre do you spend most of your time and why?
5. How do you determine what spaces are effective in supporting your learning process?
6. How does the Learning Centre fulfill or not fulfill your learning objectives?
7. Based on your observations, how are students using the Centre to engage in learning?
8. What behavioural changes have you observed since the environment has been renovated?
9. What specific design aspects to the Learning Centre do you feel best supports learning?
10. What do you think students value most about the Learning Centre?
11. What environmental/programming/structural modifications would you make to the Learning Centre in the future?
12. Would you like to add anything else regarding the design, development and programming space within the Learning Centre?
13. Do you have any further suggestions regarding topics that should be discussed on this matter?
Appendix C.

Participant Consent Form

SIMON FRASER UNIVERSITY
Faculty of Education, 8888 University Drive, Burnaby, B.C. V5A 1S6
Web: http://www.educ.sfu.ca

Informed Consent By Participants in a Research Study

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research is being conducted under permission of the Simon Fraser Research Ethics Board. The chief concern of the Board is for the health, safety, and psychological well being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns, or complaints about the manner in which you were treated in this study, please contact the Director, Office of Research Ethics by email at [email protected] or phone at 778-782-6593. Your signature on this form will signify that you understand the procedures, possible risks, and benefits of this research study; that you have received an adequate opportunity to consider the information in the study detail; and that you voluntarily agree to participate in the study.

Permission has been received from your employer, the University of the Fraser Valley, to interview you with respect to policy or procedure of the institution. Any information that is obtained during this study will be kept confidential to the full extent permitted by the law. Knowledge of your identity is not required. You will not be required to write your name or any other identifying information on research materials. Materials will be maintained in a secure location and kept for 4 years after the completion of the study.

You may obtain copies of the results of this study, upon its completion by contacting (after December 2010) either the Principal investigator, Jacqueline Pizzuti-Ashby or the co-applicant involved in this study: Dr. David Zandvliet, found at Faculty of Education, 8888 University Drive, Burnaby, B.C. Canada V5A 1S6.

Project Title: “Designing for the future: A post-occupancy evaluation of the Peter Jones Learning Centre” (Duration: January 2011 – December 2011)
Principal Investigator: Jacqueline Pizzuti-Ashby
Co-Applicant: Dr. David Zandvliet, Senior Supervisor
Investigator Department: Faculty of Education

Project Description
The campus is a unique environment in that the setting encompasses both physical and social components designed to integrate architecture and landscape with activities that support pedagogy, learning, innovation, and research. Designs of these environments have been heavily influenced by institutional objectives, pedagogical practices, and evolving theories in student learning. Astin’s theory of student involvement (1975) proposes that the further engaged a student is in campus social and academic activities the more learning is likely to occur. These activities include interaction with faculty, participation in student peer groups, and extra-
curricular assignments. Architecturally, this theory has been reflected in university administrations expansion of the traditional definition of the campus library into learning centres or commons that house a variety of spaces supporting group and individual use, student services, technology, restaurants, and faculty offices. These settings have evolved into the campus’s third place designed to foster student and community engagement. To better understand this complex dynamic between the environment, design, and its user, this mixed-methods study investigates the relationships between the understanding of learning, its translation into the built form, and the behavioural outcomes resulting from this interaction at the recently renovated Peter Jones Learning Centre at the University of the Fraser Valley (UFV).

Procedures
The study will be conducted at the University of the Fraser Valley Abbotsford campus. The study will utilize a mixed methodology that incorporates both qualitative and quantitative research methods. For the purposes of this study, observations, photography, behavioural mapping, interviews, and a survey will be employed to assess the relationship between the built environment and learning. These observations and data will then be translated into the site’s technical, functional, and behavioural components to understand their relationship with one another. By consenting to participate in this interview and/or focus group, you confirm that any information you encounter will be kept confidential and not revealed to parties outside the study. In addition, your consent to participate in a focus group includes the commitment to not discuss with others the opinions or comments of others in the focus group without their specific permission.

Benefits & Risks of the Study
The benefits of this study include the development and refinement of a methodology to assess the relationship between the built environment and learning, to inform the planning and development of facilities that are congruent with design intentions and human use. We do not foresee any risks to you as a result of participating in this study. Choosing to participate or not participate, or withdrawing from the study will not affect your grades.

I certify that I understand the procedures to be used in this study and I understand that I have the right to withdraw from the study at any time, and that any complaints about the study may be brought to the Director of Research Ethics, Dr. Hal Weinberg. I understand the risks and contributions of my participation in this study and agree to participate.

First and last name of participant

Phone and/or email Contact

Signature

Witness (signature):

Date

Page 2 of 2
Appendix D.

Space Performance Evaluation: Group Study Rooms

<table>
<thead>
<tr>
<th>Performance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: Feb-Apr 2011</td>
</tr>
<tr>
<td>Room No.: G170(A-C) &amp; G131</td>
</tr>
<tr>
<td>Purpose of space: Group rooms allocated for collaborative learning activities.</td>
</tr>
</tbody>
</table>

**Activity in space:** Students utilize this space to work primarily in pairs and groups of three or more in collaborative learning activities such as studying and group assignments. Socializing and consuming food/beverages are also quite prevalent. Peak hours of use tended to fall between the late afternoon and early evening during weekdays. Students also heavily utilized group rooms during the weekends. Students with observable physical disabilities were not observed utilizing the group rooms.

**Description of space:** The group rooms are located in the back of the Library’s first floor. Group rooms (G170A, G170B, G170C) are furnished with a moveable group table, 4 to 6 chairs, a white board, and electrical outlets. Each space has been subdivided with a soft partition wall allowing for two groups to utilize the space simultaneously. The interior wall is composed of glass allowing for transparency into the space. The exterior wall is lined with windows allowing for access to natural light and views of the campus green. The Assessment Centre (G131) is intended to serve as a test-taking environment though serves one night a week as a student study space. The area is furnished with a series of group tables, soft fabric chairs on casters, and a white board. The room’s interior wall that borders the hallway is glass though the windows are covered for privacy and to promote focus for students testing. There are no windows that directly access natural light.

**Size:** The library’s group rooms are G170A (15.35 m²), G170B (15.46 m²), and G170C (15.06 m²). The Assessment Centre G131 is 51.10 m².

**Accessibility:** Library group rooms are only accessible during library operating hours. Room G131 is only accessible one evening a weekday.

**Day Use:** Students observed in the group rooms are engaged in collaborative study and socialization. Other activities include, consuming food/beverages, cell phone use, listening to music, and watching video’s. Although wireless internet is available in the space, accessibility to electrical outlets is limited.

**Night Use:** In the evening, the space is well utilized. The artificial lighting provided in the rooms is ample is turned off after staff leave giving the impression that the space is “closed” for campus member use. Activities during the evenings include listening to music or watching videos.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
<th>Functional Criteria</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring Finish</td>
<td>Low pile, dense loop Berber carpeting. Multi-colored. Durable and suitable for high traffic. Maintenance includes vacuuming.</td>
<td>Flooring is absorbent to sound generated by foot traffic and socialization in the space.</td>
<td>Provides a seating area for student use.</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Predominantly drywall and glass. Durable surface. Maintenance includes painting, window washing, and wall cleaning.</td>
<td>Glass wall surface is not absorbent to sound and does assist in reducing the noise generated from the socialization.</td>
<td>Walls provide a place for students to lean on.</td>
</tr>
<tr>
<td>Ceiling Finish</td>
<td>Ceiling panels. Durable. Provides thermal barrier and sound insulation.</td>
<td>Provides dry coverage for students entering the space.</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>There is one glass door provided for each room.</td>
<td>The doors provide transparency to the space and some acoustic privacy.</td>
<td>The doors are frequently left open. This may be due to the lack of ventilation, rise in temperature, or frequent traffic entering and exiting the space.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
<td>Behavioural Criteria</td>
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<tr>
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</tr>
<tr>
<td>Windows</td>
<td>The library’s group rooms have access to fixed windows.</td>
<td>Provides natural light and visual access to the campus green. They provide no ventilation.</td>
<td>Students have access to natural light and can control the intensity via blinds. However, they can not be opened for air circulation or to reduction in temperature. Visual access to staff provides monitoring of the space and sense of safety.</td>
</tr>
<tr>
<td>Light Quality</td>
<td>Natural and standard fluorescent lighting provided. Day, evening and night lighting is sufficient for studying, reading, and safety.</td>
<td>Natural lighting is controlled via window coverings. Artificial lighting is ample in the space though does not allow for any adjustment such as task specification or intensity.</td>
<td>Access to both natural and artificial lighting sources suggests that the space is conducive for students engaging in learning activities. The ample lighting also provides a sense of safety and transparency to the space.</td>
</tr>
<tr>
<td>Ventilation/AC</td>
<td>Space is primarily ventilated through forced-air circulation.</td>
<td>The limited access to ventilation results in stagnant air and aromas.</td>
<td>The lack of ventilation in the space suggests that the environment not conducive for extended use.</td>
</tr>
</tbody>
</table>
| Air Quality (Temperature/ Humidity) | Temperature can not be independently controlled. 
Temperature: 19-23 °C 
Humidity: 40-45% | Temperature fluctuates depending on usage and exposure to sunlight, stability provides a comfortable environment and extended use of the space. | Temperature fluctuation suggests that the room is not conducive for extended use. |
| ICT Provision | Wireless internet provided. | Supports technology use. | Students utilize the space for their laptops. |
| Furniture | Movable group tables and chairs. | Flexible arrangement of furniture and ample seating promotes collaborative work. | Flexible arrangement of furniture results in students modifying the space to suit their activities and group needs. |
Appendix E.

Space Performance Evaluation: Library First Floor

<table>
<thead>
<tr>
<th>Performance Criteria</th>
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<tbody>
<tr>
<td>Date: Feb-Apr 2011</td>
</tr>
<tr>
<td>Room No.: G170</td>
</tr>
<tr>
<td>Purpose of space: First floor of library supports individual and group learning activities.</td>
</tr>
</tbody>
</table>

Activity in space: Campus members utilizing this space were involved in a variety of learning activities including studying, socializing, conducting research, and casually reading. The first floor is zoned for primarily individual research activities and the back is zoned for collaboration, lounging, and socialization. Peak periods of usage were weekday afternoons and evenings. Campus members with observable physical disabilities were noted utilizing the first floor.

Description of space: The entrance of the library consists of an information desk, a circulation desk, a computer station outfitted with 10 terminals that students can check email, a computer station with 14 terminals where students can conduct research and work on assignments, and a microfiche viewing station, and video station for students viewing films. In addition, there are 8 individual carrels for silent study. These stations predominantly serve those working individually. A series of library stacks run through the middle of the first floor separating the front of the library from the back. The back portion of library supports group work where quiet socialization is accepted. There are 7 group tables with 4 to 5 movable chairs located at each one. Group tables are outfitted with 8 outlets providing students access to technological support. Individual student study carrels are intermittently placed between the group tables. Group rooms (G170A, G170B, G170C) are also located within the backspace. As discussed above, these rooms contain group tables, several chairs, and a white board. Located on each far end of the library are lounging areas, arranged for group seating and furnished with soft chairs and coffee tables.

Size: 1156.72 m²

Accessibility: Library is open from Monday through Friday 8:00 a.m. to 10:00 p.m. On Saturday, the library is open from 10:00 a.m. to 6:00 p.m., and Sundays from 12:00 p.m. to 6:00 p.m.

Day Use: Campus members utilize the library's first floor for individual and collaborative study, conducting research, casually reading, and socialization. Campus members frequently access technology within the space as there are several computer terminals available for public and student use. Outlets are provided in the group tables. Wireless internet is also accessible.

Night Use: In the evening, the space is well utilized and well lit. Student primarily utilize the back of the library during evening hours settling in the lounge space or studying at one of the group tables.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
<th>Functional Criteria</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring Finish</td>
<td>Low pile, dense loop Berber carpeting. Multi-colored. Durable and suitable for high traffic. Maintenance includes vacuuming.</td>
<td>Flooring is absorbent to sound generated by foot traffic and socialization in the space.</td>
<td>Provides a seating area for student use.</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Predominantly drywall and glass. Durable surface. Maintenance includes painting, window washing, and wall cleaning.</td>
<td>Glass wall surface is not absorbent to sound and does assist in reducing the noise generated from socialization.</td>
<td>Walls provide a place for students to lean on.</td>
</tr>
<tr>
<td>Ceiling Finish</td>
<td>Ceiling panels. Durable. Provides thermal barrier and sound insulation.</td>
<td>Provides dry coverage for students entering the space.</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>Bi-fold glass doors are located at the entry. There is also one door located in the back.</td>
<td>The doors provide transparency to the space and security.</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>The back portion of the library is lined with windows that are fixed closed.</td>
<td>Provides natural light and visual access to the campus green. They provide no ventilation.</td>
<td>Students have access to natural light and can control the intensity via blinds. However, they can not be opened for air circulation or to reduction in temperature. Visual access to campus green is also provided.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
<td>Behavioural Criteria</td>
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</tr>
<tr>
<td>Light Quality</td>
<td>Natural and standard fluorescent lighting provided. Day, evening, and night lighting is sufficient for studying, reading, and safety.</td>
<td>Natural lighting is controlled via window coverings. Artificial lighting is ample in the space though does not allow for any adjustment such as task specification or intensity.</td>
<td>Access to both natural and artificial lighting sources suggests that the space is conducive for students engaging in learning activities. The ample lighting also provides a sense of safety and transparency to the space.</td>
</tr>
<tr>
<td>Ventilation/AC</td>
<td>Space is primarily ventilated through forced-air circulation.</td>
<td>The ventilation in the first floor is comfortable.</td>
<td>The ventilation of the space suggests that the environment is conducive for extended use.</td>
</tr>
<tr>
<td>Air Quality</td>
<td><strong>Temperature</strong> cannot be independently controlled. <strong>Temperature:</strong> 20-22 °C  <strong>Humidity:</strong> 35-44%</td>
<td>Temperature is fairly stable in the space. The back of the library is more susceptible to temperature fluctuation due to its exposure to sunlight.</td>
<td>Stable and comfortable temperatures support students extended use of the space.</td>
</tr>
<tr>
<td>*Temperature/</td>
<td></td>
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<tr>
<td>Humidity*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT Provision</td>
<td>Wireless internet and electrical outlets provided.</td>
<td>Supports technology use.</td>
<td>Students are observed utilizing the space for their laptops and iPods.</td>
</tr>
<tr>
<td>Furniture</td>
<td>Computer workstations, individual study carrels, group tables, couches, and lounge chairs and tables.</td>
<td>The computer workstations and individual study carrels are fixed. The group furniture in the back can be rearranged and modified promoting group and individual learning activities.</td>
<td>Flexible arrangement of furniture results in students modifying the space to suit their activities and group needs.</td>
</tr>
</tbody>
</table>
Appendix F.

Space Performance Evaluation: Library Second Floor

<table>
<thead>
<tr>
<th>Performance Criteria</th>
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<tbody>
<tr>
<td>Date: Feb-Apr 2011</td>
</tr>
<tr>
<td>Room No.: G260, G240, &amp; G242</td>
</tr>
<tr>
<td>Purpose of space: The library's second floor and study rooms are reserved for silent study and research.</td>
</tr>
</tbody>
</table>

**Activity in space:** Campus members utilizing the library's second floor were primarily involved in individual silent study. It is the only space in the PJLC dedicated to silent study. Peak periods of usage observed were weekday afternoons and evenings. A few campus members with observable physical disabilities were noticed utilizing the back of the library's study carrels.

**Description of space:** Entering the library's second floor there is a large information desk situated to greet incoming patrons, however, no staff actually work the desk. The exterior walls of the room are lined with large windows providing visual access to the Rotunda's interior, natural lighting, and views of the campus green. The library's second floor provides 3 rows of student carrels and 2 rows of library book stacks. The first row is comprised of 36 carrels placed in groups of four. The second row contains 22 carrels and the third row contains 84 student carrels. In addition, there are two rooms allocated for individual study that consist of G240 and G242. These two rooms are also lined with individual student study carrels. Room G240 contains 5 study carrels and G242 contains 8 study carrels. In total, the space provides for 163 individual study stations.

**Size:** 1251.80 m²

**Accessibility:** The library’s second floor access is based on the main library’s hours of operation: Monday to Friday from 8:00 a.m. to 10:00 p.m., Saturday from 10:00 a.m. to 6:00 p.m., and Sunday from 10:00 a.m. to 6:00 p.m.

**Day Use:** Student usage was low during the morning but increased throughout the afternoon and evenings hours. Students primarily used the space for studying although other activities were noted such as conducting research, socializing, and cell phone usage. The use of technology in the space is well supported with access to wireless Internet and electrical outlets provided in the study carrels. Students were observed utilizing their laptops, cell phones, and iPads in the space.

**Night Use:** The space was in greatest demand during afternoons and evening for individual study purposes. During the evenings, students were noted as meeting up with others to utilize the space.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
<th>Functional Criteria</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring Finish</td>
<td>Low pile, dense loop Berber carpeting. Multi-colored. Durable and suitable for high traffic. Maintenance includes vacuuming.</td>
<td>Flooring is absorbent to sound generated by foot traffic and socialization in the space. Provides a place for bags and a seating area for student use.</td>
<td></td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Predominantly drywall and glass. Durable surface. Maintenance includes painting, window washing, and wall cleaning.</td>
<td>Glass wall surface is not absorbent to sound and does assist in reducing the noise generated from socialization.</td>
<td>Walls provide a place for students to lean on.</td>
</tr>
<tr>
<td>Ceiling Finish</td>
<td>Ceiling panels. Durable. Provides thermal barrier and sound insulation.</td>
<td>Provides dry coverage for students entering the space.</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>The second floor is accessible by a three doors. Two are located at the landing of the second floor. The third door is only accessible to staff. Bi-fold glass doors are located at the main entrance of the library.</td>
<td>The glass doors provide transparency to the space and security. There is an elevator that provides those wheelchair bound access to the space.</td>
<td>The PJLC's second floor doors were added after the renovations as the noise generated in the PJLC's Rotunda increased and carried into the silent study space. As a result, these doors have insulated the space from much of the activity occurring outside the environment.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
<td>Behavioural Criteria</td>
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</tr>
<tr>
<td>Windows</td>
<td>There are windows that line the first and third row of carrels. All these windows</td>
<td>Provides natural light and visual access to people and campus green.</td>
<td>The windows provide campus members with an additional lighting source for their activities. They may also</td>
</tr>
<tr>
<td></td>
<td>are fixed.</td>
<td></td>
<td>provide a sense of safety and transparency to the space. Members can control the intensity of lighting and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>privacy via blinds.</td>
</tr>
<tr>
<td>Light Quality</td>
<td>Natural and standard fluorescent lighting provided. Day, evening, and night lighting</td>
<td>Natural lighting is controlled via window coverings. Artificial lighting is ample in</td>
<td>Access to both natural and artificial lighting sources suggests that the space is conducive for students</td>
</tr>
<tr>
<td></td>
<td>is sufficient for studying, reading, and safety.</td>
<td>the space though does not allow for any adjustment such as task specification or</td>
<td>engaging in learning activities. The ample lighting also provides a sense of safety and transparency to the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>intensity.</td>
<td>space.</td>
</tr>
<tr>
<td>Ventilation/AC</td>
<td>Space is primarily ventilated through forced-air circulation.</td>
<td>The ventilation of the space is comfortable.</td>
<td>The ventilation of the space suggests that the environment is conducive for extended use.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Temperature is not user controlled. Temperature: 18-22 °C Humidity: 39-49%</td>
<td>Temperature in the felt cold in the morning but warmed up as the forced air heating</td>
<td>Campus members utilized the space for extended periods of time.</td>
</tr>
<tr>
<td>(Temperature/</td>
<td></td>
<td>turned on.</td>
<td></td>
</tr>
<tr>
<td>Humidity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT Provision</td>
<td>Wireless internet and electrical outlets provided in the study carrels.</td>
<td>Supports technology use.</td>
<td>Students are observed utilizing the space with their cell phones, laptops, and iPods.</td>
</tr>
<tr>
<td>Furniture</td>
<td>Approximately 183 study carrels are available with chairs. The majority of carrels</td>
<td>The furniture accommodates for individual study, technology use, and research activities.</td>
<td>Furniture is fixed and designed for individual use only. Students desiring to work among one another are</td>
</tr>
<tr>
<td></td>
<td>are made of solid wood, durable, and easy to clean. Furniture is not fixed but quite</td>
<td>Each carrel accommodates one person.</td>
<td>noted as sitting next to one another in the carrels. The carrels do not provide for flexible arrangement and</td>
</tr>
<tr>
<td></td>
<td>heavy.</td>
<td></td>
<td>clearly indicate by design that the area does not support collaboration.</td>
</tr>
</tbody>
</table>
Appendix G.

Space Performance Evaluation: Rotunda

<table>
<thead>
<tr>
<th>Performance Criteria</th>
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</thead>
<tbody>
<tr>
<td><strong>Date:</strong> Feb-Apr 2011</td>
</tr>
<tr>
<td><strong>Room No.:</strong> GH102/GH210</td>
</tr>
<tr>
<td><strong>Purpose of space:</strong> Entrance and non-formal study area of PJLC</td>
</tr>
</tbody>
</table>

**Activity in space:** The Rotunda's first floor is a transitional space housing one of the two PJLC main entrances. Campus members frequently arrive and depart from the bus station and vehicle loading zone located directly outside. Human movement and foot traffic is high in this space generating noise particularly during peak periods between 11:00 a.m. and 2:00 p.m. on weekdays. Activities observed in the space include: cell phone use, casual reading a book or newspaper, waiting for bus or car ride, meeting up area for campus members, socializing, and consuming food and beverages. The Rotunda's second floor primarily supports campus members working individually with 3 small group tables provided. Activities noted in the space include studying, reading, listening to music, eating/drinking, sleeping, socializing, and cell phone use. Although wheelchair-bound campus members were seen transitioning through the space, no one with an observable physical disability was witnessed utilizing the environment for any activity. Activity within the space significantly drops during weekday evenings and weekends.

**Description of space:** First floor: 1 of 2 main entry points to the PJLC. Furnished with a fixed study bar and a series of bar chairs flexible to movement. Designed for individual use. Second floor: Furnished with a fixed study bar and a series of fixed bar stools. Three fixed group tables with fixed seating and 3 couches are also provided. The second floor provides views of Sumas Mountain, parking lot, building A, and bus transit.

**Size:** First floor: 171.94 m² / Second floor: 132.33 m²

**Accessibility:** Monday through Sunday from 7:00 a.m. to 11:30 p.m.

**Day Use:** First floor: The space is transient with campus members arriving and departing the environment. The study bar accommodates campus members engaged in casually reading, consuming food or beverages, and studying. The floor area supports area transient activities such as cell phone usage and meeting up with others. Second floor: Campus members utilize the space for individual and collaborative activities including studying, casually reading, consuming food and beverages, sleeping, socializing, cell phone use, waiting for friends/colleagues, listening to music, and watching videos.

**Night Use:** Activity is greatly reduced in the evening on both floors. First floor: Activities in the space primarily consist of campus members waiting for transportation or on their cell phones as usage is prohibited in the library. Second floor: Activities consist of listening to music, watching videos, socializing, and studying.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
<th>Functional Criteria</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flooring Finish</strong></td>
<td>Linoleum. Durable and suitable for high traffic. Maintenance includes mopping and sweeping. Slippery when wet.</td>
<td>Flooring is not absorbent to sound and as a result amplifies the traffic and voices in the space. Provides an area for students to sit while studying, waiting for bus, or meeting a friend.</td>
<td></td>
</tr>
<tr>
<td><strong>Wall Finish</strong></td>
<td>Predominantly glass and concrete. Durable surface. Maintenance includes washing windows and cleaning concrete. Aesthetically a cold and hard surface.</td>
<td>Wall surface is not absorbent to sound and as a result amplifies the traffic and voices in the space. Walls provide a place for campus members to lean on for cell phone usage or waiting for transportation or friends.</td>
<td></td>
</tr>
<tr>
<td><strong>Ceiling Finish</strong></td>
<td>Metal panels. Durable. Does not insulate the area.</td>
<td>Provides dry coverage for students entering the space. Sound echoes in the space.</td>
<td></td>
</tr>
<tr>
<td><strong>Doors</strong></td>
<td>Double doors, glass, with automated sensor system.</td>
<td>Provides transparency for students exiting and entering the space.</td>
<td>The transparency of the doors provides a sense of safety for campus members waiting for transportation.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
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<tr>
<td>Windows</td>
<td>Glass windows. Maintenance includes washing.</td>
<td>The windows are fixed and do not allow for students to adjust for ventilation purposes. Provides transparency for students who are people watching, waiting to view the parking lot, or waiting for a ride or the bus.</td>
<td>Windows allow for people watching, views of landscape, and visual access to parking lot and public transportation.</td>
</tr>
<tr>
<td>Light Quality</td>
<td>The lighting is predominantly natural with a few artificial lighting sources from the hallway, library, and the upstairs rotunda. Evening and night artificial lighting is insufficient for studying and reading. Lack of lighting may also pose as a safety issue.</td>
<td>The intensity, task specification, control, accessibility, and duration of lighting is susceptible to weather changes and time of day.</td>
<td>Lack of lighting, both natural and artificial, in the evening and night suggests that learning activities (studying, reading, technology use, and individual and group work) are not supported. Lack of lighting may discourage student use due to safety concerns. Management has not installed any artificial lighting in the area for evening and night use. In addition, not all available artificial lights are in use during evening and night use.</td>
</tr>
<tr>
<td>Ventilation/AC</td>
<td>Space is ventilated by forced-air circulation and sliding entrance doors.</td>
<td>The forced airs vents are located directly under the study bar. When operating, the air circumspects the bar and directly encounters the face of user. Ventilation caused by the entrance results in unanticipated gusts of air.</td>
<td>The frequent ventilation of the space suggests that the environment is not conducive for extended use.</td>
</tr>
<tr>
<td>Air Quality (Temperature/Humidity)</td>
<td>Located near an outdoor entrance. Temperature: 17-19 ºC. Humidity: 47%. Feels damp during heavy precipitation.</td>
<td>Breezy entrance and temperature fluctuation does not support student's extended use of the space.</td>
<td>Frequent fluctuation in temperature and dampness suggests to users that the space is not conducive for extended use.</td>
</tr>
<tr>
<td>ICT Provision</td>
<td>Wireless internet provided. Two electrical outlets available.</td>
<td>Limited access to electrical outlets does not support use of technology.</td>
<td>Limited access to electrical outlets suggests to users that the use of technology in the space is not supported. Seating near outlets appears competitive with students waiting for the space to open up for their use.</td>
</tr>
<tr>
<td>Furniture (first floor)</td>
<td>Fixed study bar installed with a series of movable stools.</td>
<td>Linear arrangement does not promote collaborative seating. Seating is limited via the number of chairs provided and layout of study bar. Stool height and design does not accommodate physically disabled students.</td>
<td>Work bar and stools provide an individual study area. Furniture and fixed arrangement discourages collaboration.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
<td>Behavioural Criteria</td>
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</tr>
<tr>
<td>Furniture (second floor)</td>
<td>A study bar installed with a series of fixed and moveable stools.</td>
<td>Linear arrangement and fixed furniture serves primarily individual use. Seating fixed and limited. Also fixed seating is unable to accommodate for disabled students.</td>
<td>Linear and fixed furniture arrangement discourages collaboration. Students moved chairs from Rotunda's first floor to upstairs to accommodate larger groups. However, flexible seating was not used as often as fixed seating. Fixed seating was padded and rotated 180 degrees. Flexible seating was hard plastic, did not rotate, and sloped away from the study bar.</td>
</tr>
<tr>
<td>Furniture (second floor)</td>
<td>Three fixed group tables with fixed seating and one moveable chair.</td>
<td>Area designed to support small group meetings and individual use.</td>
<td>Fixed group tables and seating provides group study areas. Discourages groups larger than 4 from working together and those with physical challenges from using the space.</td>
</tr>
<tr>
<td>Furniture (second floor)</td>
<td>Three moveable couches.</td>
<td>Couches accommodate 1 to 2 people and are not fixed.</td>
<td>Students utilize the couches to lounge, socialize, sleep, casually read, and study. There are no tables around the couches to support learning materials.</td>
</tr>
<tr>
<td>Other</td>
<td>The space has acoustical issues due to the surrounding surfaces of concrete, glass, and linoleum.</td>
<td>Acoustically, the space amplifies and echoes foot traffic, socialization, and cell phone usage resulting in a potential disruptive environment.</td>
<td>The space suggests that it does not support a quiet study area. Acoustical engineers have been brought in to review the space but there are no current plans to address the issue.</td>
</tr>
</tbody>
</table>
Appendix H.

Space Performance Evaluation: Writing Centre Anteroom

<table>
<thead>
<tr>
<th>Performance Criteria</th>
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</thead>
<tbody>
<tr>
<td><strong>Date:</strong> Feb-Apr 2011</td>
</tr>
</tbody>
</table>

**Activity in space:** Campus members utilize this space to work individually and collaboratively. Activities noted include studying, casually reading, listening to music, consuming food/beverages, socializing, and cell phone use. The space also absorbs campus members who can not locate seating at Clickz Cafe. There is no waste receptacle in the area resulting in a build up of trash. Campus members are observed reorganizing the furniture, seating, and space to accommodate for their activities and access to electrical outlets. No campus members were observed using the photocopier. Campus members with observable physical disabilities were not observed using the space.

**Description of space:** This space serves as the entrance to the Writing Centre. It is directly across from the Assessment Centre and off of the building’s main arterial hallway. The left side of the space is furnished with a vending machine, 2 movable tables, 4 moveable chairs, a photocopier and an adjacent table to support photocopying. The opposing wall has a row of fixed sofa bench seating with small lounge tables in between.

**Size:** 44.56 m²

**Accessibility:** Monday through Sunday from 7:00 a.m. to 11:30 p.m.

**Day Use:** Campus members use the space for a variety of individual and collaborative activities including studying, casual reading, consuming food/beverages, socializing, group study/preparation of presentations, reading, cell phone use, listening to music, and watching video’s. Although wireless internet is available in the space, accessibility to electrical outlets is limited. This results in user’s frequent modifications of the furniture layout to reach outlets.

**Night Use:** In the evening, the space is rarely utilized. The artificial lighting is turned off after staff leave giving the impression that the space is “closed” for campus member use. Activities during the evenings include listening to music or watching videos.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
<th>Functional Criteria</th>
<th>Behavioural Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring Finish</td>
<td>Linoleum. Durable and suitable for high traffic. Maintenance includes mopping and sweeping, slippery when wet.</td>
<td>Flooring is not absorbent to sound and as a result amplifies the traffic and socialization in the space.</td>
<td>Provides a seating area for student use.</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Predominantly drywall and glass. Durable surface. Maintenance includes painting and wall cleaning.</td>
<td>Wall surface is absorbent to sound and assists in reducing the noise generated from the foot traffic and socialization occurring in the cafe.</td>
<td>Walls provide a place for students to lean on while on call phones, texting, or waiting for a friend.</td>
</tr>
<tr>
<td>Ceiling Finish</td>
<td>Ceiling panels. Durable. Provides thermal barrier and sound insulation.</td>
<td>Provides dry coverage for students entering the space.</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>There are no physical doors to the space.</td>
<td>The area is accessed from the building’s two main entrances.</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>A glass panel divides the space from the Writing Centre.</td>
<td>Provides visual access to the anteroom and Writing Centre.</td>
<td>Visual access to staff provides monitoring of the space and sense of safety.</td>
</tr>
<tr>
<td>Elements</td>
<td>Technical Criteria</td>
<td>Functional Criteria</td>
<td>Behavioural Criteria</td>
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</tr>
<tr>
<td><strong>Light Quality</strong></td>
<td>Lighting provided through standard fluorescent lighting. Day, evening, and night</td>
<td>Artificial lighting is ample in the space though does not allow for any adjustment such as task specification or intensity. It suggests that the space is conducive for students engaging in learning activities or socialization.</td>
<td>Although artificial lighting is on during staff work hours, the lighting is turned off during the evening suggesting that the space is closed for use. When on, artificial lighting encourages student use and may also provide a sense of safety when in use. The artificial lighting also helps to illuminate the PJLC’s hallway during the night.</td>
</tr>
<tr>
<td><strong>Ventilation/AC</strong></td>
<td>Space is primarily ventilated through forced-air circulation and main entrance</td>
<td>Ventilation of the space is limited to forced-air circulation resulting in aromas from café stagnating in the space.</td>
<td>The ventilation of the space suggests that the environment is conducive for extended use.</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Temperature: 19 °C. Humidity: 40-45%.</td>
<td>Temperature stability provides a comfortable environment and extended use of the space.</td>
<td>Temperature stability suggests that the space is conducive for extended use.</td>
</tr>
<tr>
<td><strong>ICT Provision</strong></td>
<td>Wireless internet provided.</td>
<td>Supports technology use.</td>
<td>Students utilize the space for their laptops.</td>
</tr>
<tr>
<td></td>
<td>Few electrical outlets available.</td>
<td>Electrical outlets support technology use.</td>
<td>Lack of electrical outlets suggests that extended use of technology is not supported in the space. Furniture provided in the space is frequently modified to reach outlets.</td>
</tr>
<tr>
<td><strong>Furniture</strong></td>
<td>Fixed sofa bench seating with fixed adjacent tables</td>
<td>Fixed and linear arrangement of seating and side tables does not promote individual and group work.</td>
<td>Fixed and linear arrangement of furniture results in students modifying the space by taking the moveable square tables and placing them in front of the bench seating.</td>
</tr>
<tr>
<td></td>
<td>Two moveable square restaurant tables</td>
<td>Moveable square tables provides a work surface for the students working individually or as a group. They also serve as a work surface for those utilizing the sofa bench seating.</td>
<td>Restaurant tables encouraged individual and group work.</td>
</tr>
<tr>
<td></td>
<td>Five moveable chairs</td>
<td>Provides seating for the two square restaurant tables.</td>
<td>The lack of table surface around couches suggests that the couches are for lounging or sleeping.</td>
</tr>
<tr>
<td></td>
<td>Rectangular shaped moveable table</td>
<td>This table is adjacent to the photocopier and serves as a workspace for those making photocopies.</td>
<td>The space suggested that it did not support students learning resources and valuables.</td>
</tr>
</tbody>
</table>
Appendix I.

Space Performance Evaluation: Clickz Café

<table>
<thead>
<tr>
<th>Performance Criteria</th>
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<tbody>
<tr>
<td>Date: Feb-Apr 2011</td>
</tr>
<tr>
<td>Room No.: G168</td>
</tr>
<tr>
<td>Purpose of space: Clickz Café provides food and beverage services to campus members. Attract members to the PJLC, provide areas for collaboration, and generate greater activity in PJLC.</td>
</tr>
</tbody>
</table>

Activity in space: Campus members utilizing the Clickz Café were involved in individual and group study, collaboration, socializing with others, ordering and consuming food and beverages, and conducting research on their computers. Serving as an area of convergence, campus members were noted as frequently bumping into one another and connecting to discuss classes, assignments, work-related issues, and upcoming events. Peak periods of usage observed were weekday mornings and afternoons. Campus members with observable physical disabilities were not observed utilizing the Clickz Café.

Description of space: The Clickz Café is furnished with approximately 12 café tables and 20 plastic café chairs. The furniture is movable and supports flexible arrangements. The walls are painted green and orange to provide color. Lighting in the space is supplied by both artificial and natural sources. There are three large windows in the space that provide access to both natural light and views of the campus green. Two of these windows are adjustable for air circulation. Blinds are provided as window coverings to control the intensity of light. Adjacent to one of the PJLC’s two main entrances, there is an additional glass door in the space that is frequently closed but available in case of an emergency.

Size: 75.16 m²

Accessibility: The current hours of operation are Monday to Thursday from 7:30 a.m. to 9:00 p.m., Friday from 7:30 a.m. to 4:00 p.m., Saturday from 8:00 a.m. to 3:00 p.m., and closed on Sunday.

Day Use: During the day, the cafe is utilized for studying, socializing, and consuming food and beverages. Students are noted as meeting up with others to quiet study together or collaborate on projects and discuss tests. Campus members also utilize technology, such as their cell phones and computers, within the space. The cafe has access to wireless Internet and electrical outlets are available.

Night Use: During the evening, usage decreases and campus members primarily use the space for study purposes. This decrease in usage may be due to maintenance stacking chairs and tables against the wall to wash the floor.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Technical Criteria</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Flooring Finish</td>
<td>Linoleum. Durable and suitable for high traffic. Maintenance includes mopping and sweeping. Slippery when wet.</td>
<td>Flooring is not absorbent to sound and as a result amplifies the traffic and socialization in the space.</td>
<td>Provides a place for bags and a seating area for student use.</td>
</tr>
<tr>
<td>Wall Finish</td>
<td>Predominantly drywall and glass. Durable surface. Maintenance includes painting, window washing, and wall cleaning.</td>
<td>Glass wall surface is not absorbent to sound and does assist in reducing the noise generated from socialization.</td>
<td>Walls provide a place for students to lean on.</td>
</tr>
<tr>
<td>Ceiling Finish</td>
<td>Ceiling panels. Durable. Provides thermal barrier and sound insulation.</td>
<td>Provides dry coverage for students entering the space.</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td>Two heavy glass doors are located at the main PJLC entrance and one side door is directly located within the café space. Both have to be manually pulled to enter the space.</td>
<td>The glass doors provide transparency to the space and security. They also provide access to natural light and ventilation. Their heavy weight would make them difficult to open for a member that was physically disabled.</td>
<td>The café’s side door is primarily closed. However, during warmer days the door was left ajar. The PJLC main entrance doors are problematic during peak periods of usage as café patrons attempt to keep them open in order to maintain their position in line.</td>
</tr>
<tr>
<td>Elements</td>
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</tr>
<tr>
<td>Windows</td>
<td>There are three main windows to the Café. Two of these windows can be adjusted by patrons.</td>
<td>Provides natural light and visual access to people and campus green. Two of the 3 windows provide users with the ability to control ventilation and subsequent temperature.</td>
<td>The windows provide campus members with an additional lighting source for their activities. They also provide a sense of safety and transparency to the space. Members can control the intensity of lighting and privacy via blinds.</td>
</tr>
<tr>
<td>Light Quality</td>
<td>Natural and standard fluorescent lighting provided. Day, evening, and night lighting is sufficient for studying, reading, and safety.</td>
<td>Natural lighting is controlled via window coverings. Artificial lighting is ample in the space though does not allow for any adjustment such as task specification or intensity</td>
<td>Access to both natural and artificial lighting sources suggests that the space is conducive for students engaging in learning activities. The ample lighting also provides a sense of safety and transparency to the space.</td>
</tr>
<tr>
<td>Ventilation/AC</td>
<td>Space is primarily ventilated through forced-air circulation and doors.</td>
<td>The ventilation of the space is comfortable. However, during peak periods of usage, ventilation caused by the entrance doors results in unanticipated gusts of air through the space.</td>
<td>The ventilation of the space suggests that the environment is conducive for extended use.</td>
</tr>
<tr>
<td>Air Quality (Temperature/Humidity)</td>
<td>Temperature is not user controlled. Temperature: 20-22 °C Humidity: 40-45%</td>
<td>Temperature was fairly stable in the space.</td>
<td>Campus members utilized the space for extended periods of time.</td>
</tr>
<tr>
<td>ICT Provision</td>
<td>Wireless internet and 6 electrical outlets provided.</td>
<td>Supports technology use.</td>
<td>Students are observed utilizing the space with their cell phones, laptops, and iPods.</td>
</tr>
<tr>
<td>Furniture</td>
<td>Approximately 12 café tables and 20 plastic orange and black chairs. The tables and chairs are durable and easy to clean. Furniture is not fixed.</td>
<td>The furniture accommodates for individual and group work and can be modified for a variety of activities. The tables accommodate 2-4 people.</td>
<td>Flexible arrangement of furniture results in students modifying the space to suit their activities and group needs. Being metallic, the tabletops reflected the sun. This may have resulted in students utilizing tables that were farther from the sun's direct exposure. Given its frequent use, the furniture often seemed dirty.</td>
</tr>
</tbody>
</table>
Appendix J.

Recommendations

A series of recommendations are provided based on the PJLC interviews, observations, and evaluations conducted over the 2011 winter term. The main concerns identified include lighting, acoustics, and accessibility of the PJLC. Included are students’ suggestions that identify issues pertaining to the PJLC’s design, function, and operation.

Artificial lighting

During the night time observation of the PJLC, artificial lighting appeared inadequate on the Rotunda’s first and second floor and in the facility’s arterial hallway. Campus members’ usage of the space for reading and studying activities appeared compromised due to the lack of illumination in the environment; in addition, members may have also interpreted the dim lighting as a safety concern (see Figure 32). Upon further investigation, it was noted that artificial lighting was available for use on the Rotunda’s second floor and in the PJLC main hallway but was turned off.

Figure J1. Rotunda GH102 at night.

Note. J. P. Ashby, personal photograph, April 11, 2011.

I notified administration of my observations and the lack of lighting I perceived in the space. Upon returning to the PJLC the following evening, I noticed that all artificial lighting available in the Rotunda was in operation. I also witnessed an increased usage of the Rotunda for study and reading activities. In Figure 33, the lighting provided from the Rotunda’s second floor cast down and appears to offer adequate illumination for students to engage in studying activities on the first floor.
Figure J2.  Rotunda GH102 at night with lights in use.

Note. J. P. Ashby, personal photograph, April 12, 2011

I would recommend that all lights in the Rotunda be in use during the night hours of operation. Furthermore, because the Rotunda’s first floor is not equipped with its own independent lighting source its illumination relies upon surrounding spaces. The only sources include the Rotunda’s second floor recessed lighting and the library. As a result, it is suggested that the Rotunda’s first floor be furnished with its own designated lighting source. In contrast, during the day it was observed that the Rotunda’s lighting was all in usage. To conserve energy, administration may want to consider how it illuminates facility the facility during all hours of operation.

Noise

Indicated by administration and students interviewed, the noise generated in the PJLC is a growing concern. Students interviewed describe that during the PJLC’s peak periods the increase in noise volume can be disruptive to studying and the services being rendered in the space. The physical design of the facility and its hard surrounding surfaces amplify the acoustics. Therefore, it is recommended that the installation of sound absorbing panels be considered in the Rotunda to dampen the sound.

Accessibility

UFV may want to consider including students with disabilities as part of their planning and design team in order to learn how to best support students who are limited in mobility and manoeuvrability or are challenged by certain impairments. In addition, students with disabilities may have specific safety concerns that need to be addressed and incorporating these issues into the physical design of the space may be necessary in order to create a more inclusive environment in which they can learn.
Student recommendations
Students interviewed were asked about the environmental, programming, or structural modifications they would make to the PJLC to better support their use of the facility. These suggestions include:

PJLC
• Readjusting the PJLC space plan to dedicate one area of the facility to support student services and study activities that require a quiet environment.
• Extending the operational hours of the student support services, such as the Writing Centre, Math Centre, Clickz Café, library, and computer lab to accommodate students that work during the day.
• Creating more discipline-specific collaborative learning spaces, such as the Math Centre, that offer access to discipline-specific resources and personal expertise supporting students in that field of study.

Clickz Café
• Expanding the physical size of the space to accommodate more campus members.
• Increasing the number of tables available in the area.
• Offering a greater variety of food options such as hot meals.

Library
• Providing campus members with access to smart rooms that allow for groups to work on collaborative activities such as class presentations.
• Increasing the number of Group Study Rooms available for student use.
• Increasing access to natural light.
• Repainting the library.
• Updating learning resources, such as books and periodicals, to provide students with the latest and most current literature on their discipline.

Envision Computer Lab
• Removing partitions separating the computer terminal stations.
• Providing greater desk space at the terminals for learning resources such as books and note-taking devices.
• Furnishing the lab with wireless printers.

Math Centre
• Expanding the square footage of the Math Centre to increase occupancy of the space and accommodate additional students and resources.
• Requiring reservations to book the larger tables in the Math Centre.