



A MULTILAYERED APPROACH TO UNDERSTAND AND IMAGINE DOCTORAL STUDENTS' SPACES OF LEARNING

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ABSTRACT

Aim/Purpose	The purpose of this qualitative study was to identify the main conceptualizations of learning space from doctoral students' perspectives. The aim was to develop a participatory approach to make students' multiple voices heard.
Background	Doctoral experience is viewed as being influenced by social practices of the scholarly communities; learning space in this context is a collective resource that can be altered through imagination of its inhabitants. The intersection of Lefebvre's <i>Production of Space</i> in architecture and <i>situated learning</i> theory in education enabled building an integrated conceptual framework to explore learning space of doctoral students in its complexity.
Methodology	Three research questions reflected theoretical and practical aims. To answer them, drawing on Design Based Research, I developed multi-phased research through three sequential phases: questionnaire, Photovoice, and prototyping, which respectively addressed subjective, objective, and co-constructed aspects of learning spaces.
Contribution	This study is one of the few studies that looks at doctoral students learning spaces within the literature of learning spaces. It supports the development of a participatory procedure to design learning spaces for doctoral students.
Findings	Findings suggested that learning space is a layered multi-faceted phenomenon and a changing entity. Doctoral students believed that learning space is an indicator of support from doctoral programs and has a potential to improve and sustain their well-being.
Recommendations for Practitioners	Inviting students to take charge of the configurations of their working environment is suggested for higher education institutions. Doctoral students imagined using movable, folding, and writable walls to create private spaces for individuals as well as collaborative workspaces.
Recommendations for Researchers	Identifying the interactions between learning space and learning over a longer time frame both in undergraduate and graduate settings can help us view the campus through a <i>spatial ecology</i> model. Also, future research might examine a

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	participatory approach to design and research on learning spaces around parallel partnerships with other research-intensive universities.
Impact on Society	Findings from this study identified areas for future studies and actions suggesting implications for learning space studies for the U15 (Group of Canadian Research Universities) and U21 (the leading global network of research universities for the 21st century).
Future Research	Considering the radical changes that COVID-19 has brought in how we work, collaborate, study, and engage in social events, it is vital for higher educational institutes to rethink their learning spaces for the post- COVID era to support students' learning and their meaningful engagement in learning communities and learning spaces. Further exploration on learning spaces in post COVID era is needed to expand the empirical knowledge on learning spaces, and thus, to inform research scholars subsequent work in the educational field.
Keywords	learning spaces, doctoral education, design-based research (DBR), participatory design

INTRODUCTION

Learning space is an important factor, among many, in the complex relationship that enables learning and is an integral part of teaching, learning, and research activities. Often, learning space in higher education setting has been considered in the context of space planning or in the context of campus master-planning and architecture, which aims at providing appropriate amounts of space for the defined uses and to maximize their uses (Temple, 2007). The idea of strategic planning of the university estate has emerged to link decisions about the estate to wider issues of institutional strategy, but it has been dominantly concerned about space utilization and financial effectiveness (Avery, 1994; Higher Education Funding Council for England [HEFCE], 2000). There is limited literature with a focus on space issues in relation to teaching and learning, or research-related practices (Beckers, 2019; Temple, 2008). Furthermore, despite an increasing interest in learning space research both in education and architecture, the key basic concepts in relation to learning and space remain uninvestigated (Boys, 2011; Zeivots, & Schuck, 2018).

Higher education institutions are recognized as key agents of knowledge-based economies (Lešer et al., 2018), which has necessitated academic programs to re-frame doctoral education through incorporating responsive approaches, skills, and environments to support students' learning and prepare them for potential diverse futures within and/or beyond the academia, where they can address the complex problems of the new age (Nerad, 2012; Walker et al., 2009; Wickramasinghe & Borger, 2020). Interrogating the simplistic view that universities are a blank page on which personal lives of space inhabitants are written, Temple (2014) underlines the connection between learning space and the intellectual and social functions of those spaces.

McAlpine and Norton (2006) suggested that, if doctoral education is to be changed towards an integrative and systemic perspective, it can best be achieved through thinking and acting based on the factors that are influencing students' experiences of the doctorate. Acknowledging that students are central to the doctoral undertaking, literature suggests their voice is least heard (Golde, 2000; McAlpine & Norton, 2006; Zeivots, & Schuck, 2018). Therefore, it is safe to assume that the voice of students, the intended users of the learning spaces, is also missing in designing such spaces.

At the same time, contemporary approaches in architecture and design emphasize the direct and active participation of all stakeholders in the design process. This approach can make design a participatory process and more meaningful to the people who will ultimately benefit from the products of design. This approach is based on a contemporary shift in perspective at the collaborative domain of

design and social science which Sanders (1999) described as *postdesign*. It focuses on a co-design process where people are invited to design together providing a large set of ideas and opportunities.

STATEMENT OF THE PROBLEM

This study explores the notion of learning space and how it might be understood, used, and envisioned by the learners within the context of doctoral education in its changing time. Drawing on a Design Based Research approach, I developed *design methodology* and *domain theory* to explore students' perceptions, experiences, and ideals of their learning spaces, which includes an integrated conceptual framework incorporating related theories of Architecture and Education plus the procedure for data gathering and knowledge creation about learning space design through a participatory approach. The aim was to address the interplay between subjective, objective, and co-constructed aspects of learning spaces and develop a participatory model to make students' multiple voices heard and a design framework to be used in the next iterations.

LITERATURE REVIEW

Preparing the next generations of PhD graduates, individuals who are able to contribute to address and solve the twenty-first century's complex problems, requires a paradigm shift in doctoral education towards developing a learning process that can take place within different learning communities and learning environments (Wickramasinghe & Borger, 2020). Providing students with the experience of being a member of scientific communities could support students' doctoral studies experiences and foster PhD students' active agency in scholarly communities.

A scholarly community can be seen as a learning environment that integrates different elements such as supervision, knowledge, learning and assessment practices, as well as the learning environments (Gardner, 2007). There is a growing literature on the importance of communities of practice within learning environments and their influence on students' experiences, their professional identities, and their development of expertise in doctoral level (e.g., Austin, 2009; McAlpine & Norton, 2006; Wickramasinghe & Borger, 2020). However, learning spaces, as an important factor of a scholarly community, among others, and their relationships with other involving factors have not been explored enough.

Understanding students' learning experiences within the existing spaces along with their perceptions and ideals of a learning space is critical to evaluate the spaces and identify their real needs. It can help illuminate our understanding of learning spaces to explore the potential possibilities to support students' learning within communities of practice.

The literature informing learning spaces comes from a range of disciplinary and professional perspectives, including but not limited to those related to architecture and design (Long & Ehrmann, 2005; Savin-Baden, 2007; Thomas et al., 2019), students' learning (Beckers, 2019); Bond & Goodchild, 2012; Parisio, 2013; Radcliffe et al., 2009), and environmental behaviorism (Scott-Webber, 2004).

In this study, the initial research questions confined the scope of the literature review. The review of the literature was framed between literature that engages "space" and "learning" within the transitioning doctoral education in twenty-first century. The review of the literature addresses the territory between two domains – education and architecture – to integrate them, to illustrate the field within the context of doctoral education, and to address a gap within the literature that became the focus of this study. Furthermore, through the perspectives of design and education, the review of the literature mapped the field based on the research questions and identified the underpinning theoretical and methodological framework of this research.

Historically, the study of learning spaces in higher education settings has not attracted a great deal of attention from scholars (Temple, 2008), but it has grown substantially in recent years. Gierdowski

(2013) suggested several factors have brought learning space research to the forefront; twenty-first century's technologies as well as teaching and learning trends such as social constructivist theory and active learning pedagogy (Basdogan & Morrone, 2021; Brown, 2005; Chism, 2006; Scott-Webber, 2004) appear to have become among the most important factors in developing the learning space studies. It is worth mentioning that most of these studies that have been conducted in higher educational settings have focused more on undergraduate education (Ingram et al., 2013; Riddle & Souter, 2012; Rodriguez, 2018; Temple, 2008). To satisfy the growing need for spaces more conducive to learning for undergraduate students, an array of spaces for different purposes has been studied within the context of libraries, spaces such as non-traditional facilities like cafés (Harrop & Turpin, 2013; Stewart, 2011), group study areas, (Dallis, 2016; Holder & Lange, 2014), social learning spaces (Bryant et al., 2009; Carpenter, 2011; Chan & Spodick, 2014), collaborative spaces (Booth et al., 2012; Cunningham & Walton, 2016; Mei & May, 2018), computer stations (Bailin, 2011; May & Swabey, 2015), individual study spaces (Lux et al., 2016; Paretta & Catalno, 2013), as well as areas for solitude and quietness (Beard & Bawden, 2012; Cha & Kim, 2015; Massis, 2012). Despite the variety of studies on different aspects of doctoral education, its current situation and its potential possibilities for future research into learning spaces in doctoral education seems to be missing in the spectrum of learning space research. In a recent research project, emphasizing spatial experiences of doctoral students, Promsaka Na Sakonnakron and Burford (2020) underlined the significance of offices as meaningful learning spaces.

Giving a solid definition to a space for learning is problematic since it is an ambiguous and complicated notion due to the complicated relationship between learning and space. The concept of learning space simply expresses the idea that there are potential diverse forms of spaces in which learning can occur. However, there is a considerable complexity of interrelationships between learning and space (Boddington & Boys, 2011). To grapple with this complexity and avoid over-simplifying the notion of a learning space, learning spaces should be seen from both architectural and educational angles through related theories and practices.

In the context of higher education, a learning space can be different for each person in diverse situations of their lives. However, Savin-Baden (2007) suggested some common elements and overlaps of people's experiences within academic contexts. The elements include "physical and/or psychological removal from the normal learning environment", "the creation of specific time for writing or reflection", "using social learning spaces for debate", and "accessing digital spaces for discussion and reflection" (p. 8). These common elements are helpful to confine a learning space to conceptual, personal, social, digital, and physical spaces in this study.

EDUCATIONAL PERSPECTIVE: LEARNING IS A DYNAMIC SOCIAL PROCESS

Learning space is not the only factor when it comes to student learning in higher education, but as Gierdowski (2013) mentioned, it is a critical variable in the equation. Emphasizing learning as complex and social, Kim (2018) acknowledged that students' learning is situated within distinct and different academic communities in higher educational setting, which Lave and Wenger (1991) already called *communities of practice*. Such communities can provide potential learning environments for doctoral students with certain social practices. Considering the importance of communities of practice in learning space debate offers a conceptual model of learning as a dynamic social process; this model, according to Boys (2011), is complex, non-binary, and situated. Building on this theory enables us to explore how different learning spaces can make participants feel safe or uncomfortable, and the impact this can have on their learning."

ARCHITECTURAL PERSPECTIVE: A DYNAMIC INTERACTION BETWEEN SPACE AND OCCUPANTS

A growing debate on (re)designing the learning spaces in higher education has emerged over the past few years. Despite the growing constructions, Temple (2008) argued space was an under-researched

topic in higher education settings because it was rarely investigated as an integral part of teaching, learning, and research activities. There are also recent studies that indicate explicit links between the complex interplay between spaces and learning remain poorly explored (Elkington, 2019; Ellis & Goodyear, 2016) and, at the same time, theories of learning themselves rarely emphasize the importance of space.

In higher education institutions, consideration of space has commonly taken place either in the context of space planning or as part of campus master-planning. Nevertheless, the campus master-planning of each institution can be informed by contextual research considering the relationship between students' learning experiences and learning spaces. However, Boys (2011) clarified that the new trend on developing learning spaces are mostly based on simplified notions of formal-informal learning spaces, which may offer exciting additions to the existing spaces, but they do not necessarily enable a better conceptual framework, appropriate research methods, or strategic critique to be developed.

Contemporary architectural theories started since the 1980s have been challenging the underlying assumption that declares design intention correlates directly and obviously with the lived reality. Considering this historic shift in architectural theory, Boys (2011) indicated that “new ideas about learning are still being translated into built form with little reference to the most developments in architectural theory” (p. 28). The historic shift in architectural theory has been part of a wider paradigm shift from modernist thinking drawing on simple expressions of function, coherence, and order towards postmodernist concepts of hybridity and dynamism (Harvey, 1989; Jameson, 1992). Consequently, the contemporary understanding of space based on architectural theory has engaged with articulating relationships between space and occupants more as a dynamic interaction and less as a stimuli-response mechanism. In fact, the interaction between space and its occupants is more complex and fluid than any cause-and-effect relationship. Moving away from modernist to postmodernist/post-structuralist assumption, space is understood as inherently performative and event-based not just a neutral container or setting into which we can pour behaviors.

Thus, as space is seen as a relationship rather than just a setting, it can never exist in a meaningful way without the occupants who inhabit it. This approach potentially can integrate with the contemporary theories of education — here, doctoral education — and inform the design of learning spaces. The intersection of architectural theories with re-conceptualization of doctoral education bundling as a social and spatial practice, which is open to transformation, enables us to build an integrated conceptual framework about spaces for learning in doctoral education. Obviously, the framework is not about developing a design guideline or offering any design solutions; it is more about finding the problems and questions to ask within the complex relationship between space and the act of learning in this context, which can support and inform design of learning spaces in the future.

THEORETICAL FRAMEWORK

CREATING THIRD SPACE

This study draws on the intersection of theories of space in architecture along with educational theories related to doctoral education; hence, it has necessitated creating an “in-between” (Bhabha, 2012) conceptual framework (Figure 1), which enables sharing attributes of both fields. Incorporating participatory design as a theory for action has made the integrated framework into a movable third space towards action.

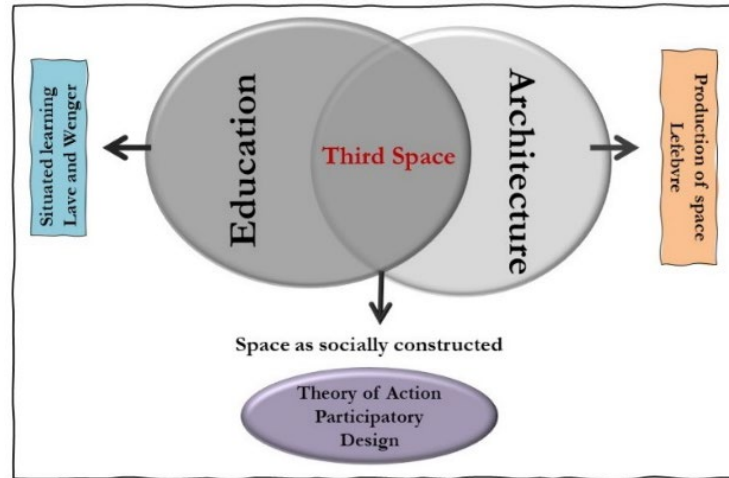


Figure 1. An integrated conceptual framework to study learning spaces in doctoral education

PRODUCTION OF SPACE: COMPLEXITY AND AMBIGUITY OF SPACE

Articulating learning in a spatial context, this study is framed within the discourses of Lefebvre's (1991) *Production of Space*, where he proposes a spatial triad as a means to conceptualizing the relationships between a space and its inhabitants.

Lefebvre (1991) theorized the production of space as a dialectical interaction between these three factors: physical, mental, and social space. Framing the learning spaces within Lefebvre's theory of space, a learning space cannot be seen as a container where we can pour behaviors through a cause and effort relationship; instead, it can be perceived as fluid and event-based phenomena. In addition, based on learning sciences (Cormier, 2008), guided by post-structural thinking about education, learning is a complex process of sense-making to which each learner brings their own context and has their own needs.

Figure 2 illustrates Lefebvre's (1991) spatial triad and its relationship with the research questions.

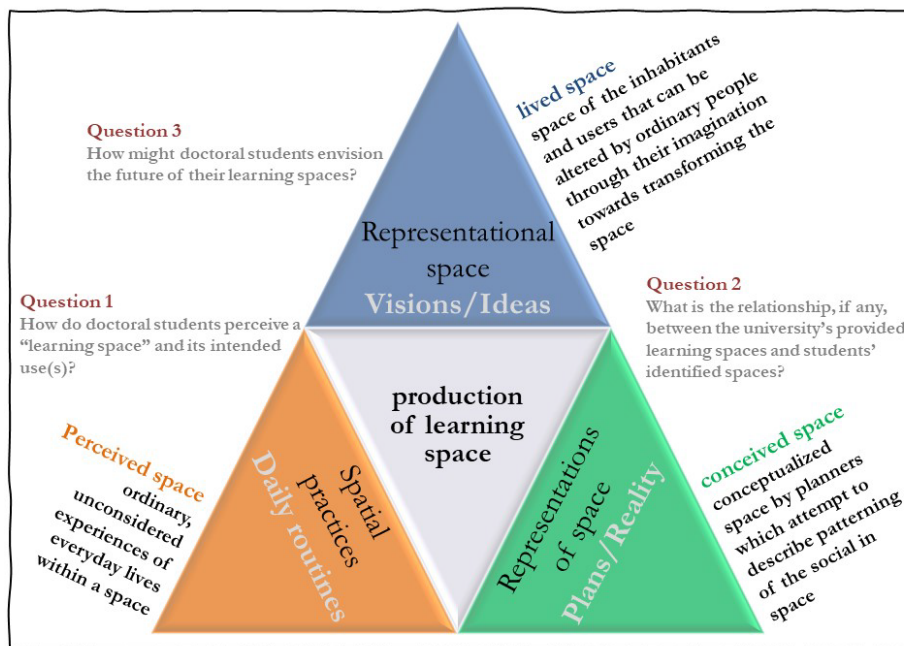


Figure 2. Lefebvre's production of space and research questions

SITUATED LEARNING: SITUATEDNESS AND COMPLEXITY OF LEARNING

Situated learning theory and the concept of community of practice (Lave & Wenger 1991) have been applied to re-conceptualize doctoral education (Nerad, 2012; Rigler et al., 2021). A learning space based on situated learning theory may include the physical spaces, but it is not necessarily limited to physical places; instead, it constructs of the person's experience in the social environment. Considering that doctoral experience is influenced by the social practices of the scholarly communities, learning space can be seen as a socially constructed and a collective resource, which aligns with Lefebvre's (1991) conceptualization of space

PARTICIPATORY DESIGN TO RE-CREATE LEARNING SPACES

Participatory design, developed since the 1990s (Blomberg & Kensing, 1998; Muller, 1991, 2009; Sanders, 1993), is suggesting a way to actively involve all stakeholders in the design process to ensure the product of design meet their needs. The creative processes of participatory design engage stakeholders in design through framing and re-framing perspectives and understandings and co-generating a design relevant to them and to the educational requirements of the contemporary education when we frame it in the learning space context.

Sherringham and Stewart (2011) suggested that a playful, visual stimulus and a guiding framework for engagement would enable communication between different voices and inform the future of learning space design. As an exploratory process, applying participatory design in learning spaces enables creative and imaginative engagements with new learning scenarios.

RESEARCH QUESTIONS

The intention of the questions was twofold. The first aim was to unravel what matters about learning space in graduate programs and its relationship with learning and research practices from doctoral students' perspectives. The second aim was to create a case for a participatory design process, where students, who identified that area of the issue(s) in their learning spaces, can imagine possible design solutions to meet their needs.

Table 1. Summary of research questions and methods of data collection and analysis

Phase	Research Question	Data Collection Method	Analysis Method	
			General Strategy	Complimentary Strategy
One	How do doctoral students perceive a "learning space" and its intended use(s)?	Questionnaire	Reflexive Thematic Analysis (Inductive & deductive)	Reflexive iteration Axial coding
Two	What is the relationship, if any, between the university's provided learning spaces and students' identified spaces?	Photovoice Semi-structured interviews	Reflexive Thematic Analysis (Deductive, latent & inductive)	Reflexive iteration Axial coding Art-informed approach
Three	How might doctoral students envision the future of their learning spaces?	Participatory Prototyping Notes, Sketches, Prototypes	Reflexive Thematic Analysis (Latent, & inductive)	Reflexive iteration Art-informed approach

To answer the research questions, I developed a multi-phased research project through three sequential phases, and, accordingly, I used different methods of data collection and analysis for each phase.

Data from the questionnaires addresses the subjective aspect of learning spaces (first question), Photovoice plus semi-structured interviews address objective aspect of learning spaces (second question), and participatory prototyping informs co-constructed aspect of learning space (third question). Table 1 summarizes the data sources as well as the collection and analysis methods related to each phase of the study and the research question. I elaborate each phase in relation to its data collection method and the analysis strategy subsequently.

RESEARCH METHODOLOGY

This study was conducted within the framework of Design-Based Research (DBR). DBR seeks to increase the impact of education research into further and better practice through generating “new theories, artifacts, and practices” (Barab & Squire, 2004, p. 2), in iterative cycles of designing, evaluating, and re-designing.

F. Wang and Hannafin (2005) assigned the basic characteristics of DBR as pragmatic, grounded, interactive, iterative and flexible, integrative, and contextual. The distinctive attributes of DBR are interrelated with the tenets of this study.

Based on the DBR literature, Plomp (2007) concluded that DBR experiences are comprised of the following three phases: *preliminary research*, which includes context analysis, literature review, and development of theoretical framework; *prototyping phase* as micro-cycles of research with formative evaluation; and *evaluation* phase to reflect on the process and the learned lessons. Figure 3 illustrates the interrelation of DBR phases (Plomp, 2007) and research questions.

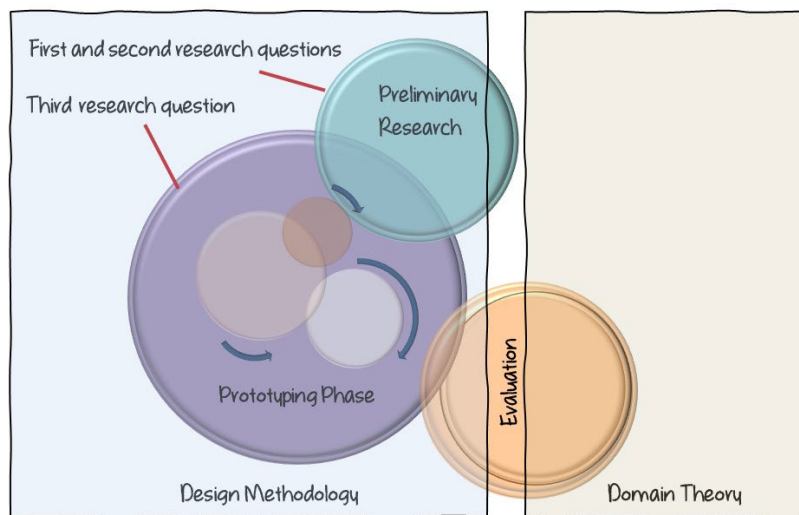


Figure 3. Plomp's DBR phases and research questions

DEVELOPING DOMAIN THEORY AND DESIGN METHODOLOGY

DBR offers opportunities for development of theories through problem analyses, design procedures, and design solutions to develop useful theories. Edelson (2002) described these theories respectively as *domain theories*, *design methodology*, and *design frameworks*.

This study supported the development of *domain theory* and *design methodology* (Figure 4). As Edelson (2002) explained, domain theory might be about learning environments and how they influence teaching and learning. The *domain theory* included a descriptive analysis of the area of the problem emerged from the first and second phases. The aim of the third phase, participatory prototyping, was to address the co-constructed aspect of learning spaces as the desired outcome of problem analysis.

According to Edelson (2002), a *design methodology* is a design procedure that provides guidelines for the process rather than the product. The purpose of the procedure developed in this study was to reach areas connected to understandings, experiences, and imaginations of doctoral students about learning spaces. The design procedure drew on the concept of *different degrees of users' knowledge* in Design Research Methods including *what people say*, *what people do*, and *what people make* (Sawhney et al., 2003), which correspond respectively to explicit, tacit (observable), and latent knowledge. In the succeeding sections, I will elaborate the design process developed based on this concept of Design Research Methods.

Figure 4 illustrates the development of design adapting a diagram by Reeves (2006), which demonstrates the iterative development of the process within a DBR approach.

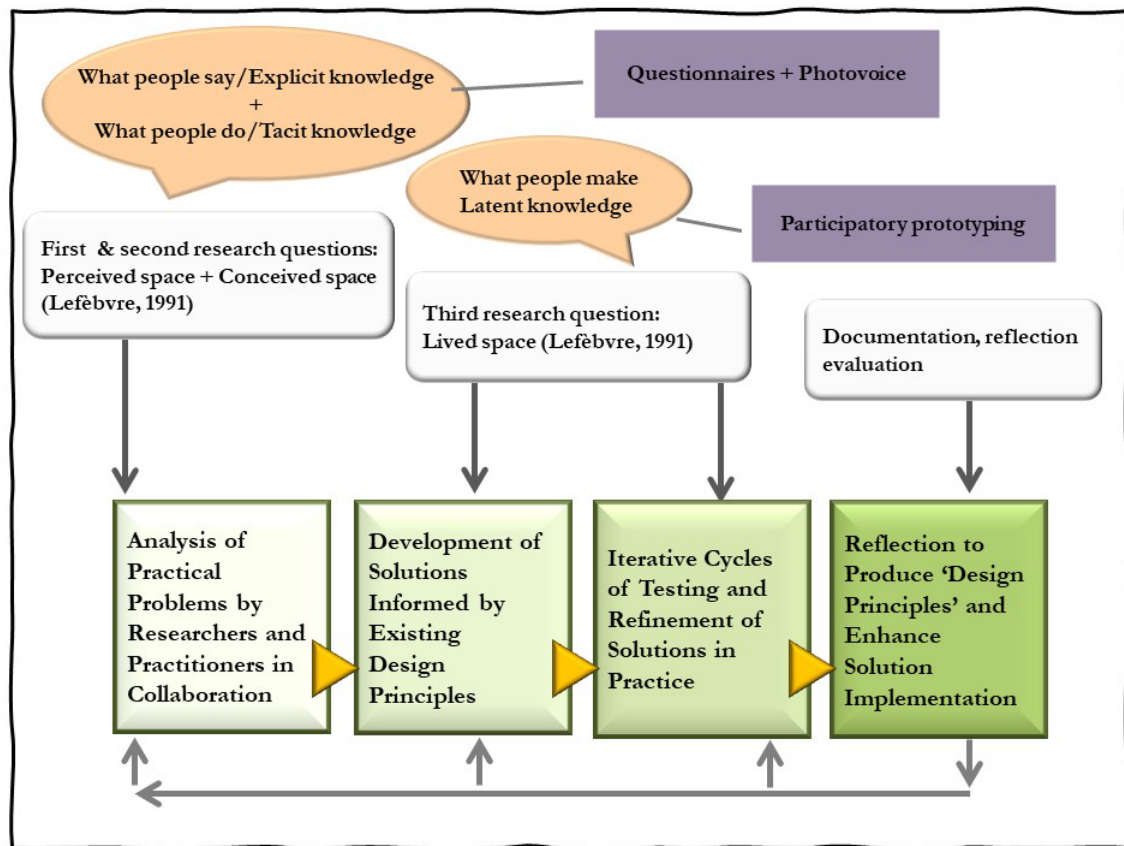


Figure 4. DBR and participatory design to develop domain theories and design methodology (Reeves's (2006) adopted diagram)

DATA COLLECTION METHODS

The organization of this study drew on the logic of DBR, which allows employing different data analysis strategies based on the collected data (F. Wang & Hannafin, 2005) to explore the phenomenon in its complexity.

In this qualitative study, the collected data from each stage was analyzed to refine the needs of the study and select the appropriate method for collecting data in the subsequent phase. Sequential phases of data collection methods included questionnaires to address subjective aspect of learning spaces, Photovoice plus semi-structured interviews to address objective aspect of learning spaces, and participatory prototyping to address co-constructed aspect of learning spaces (Figure 5).

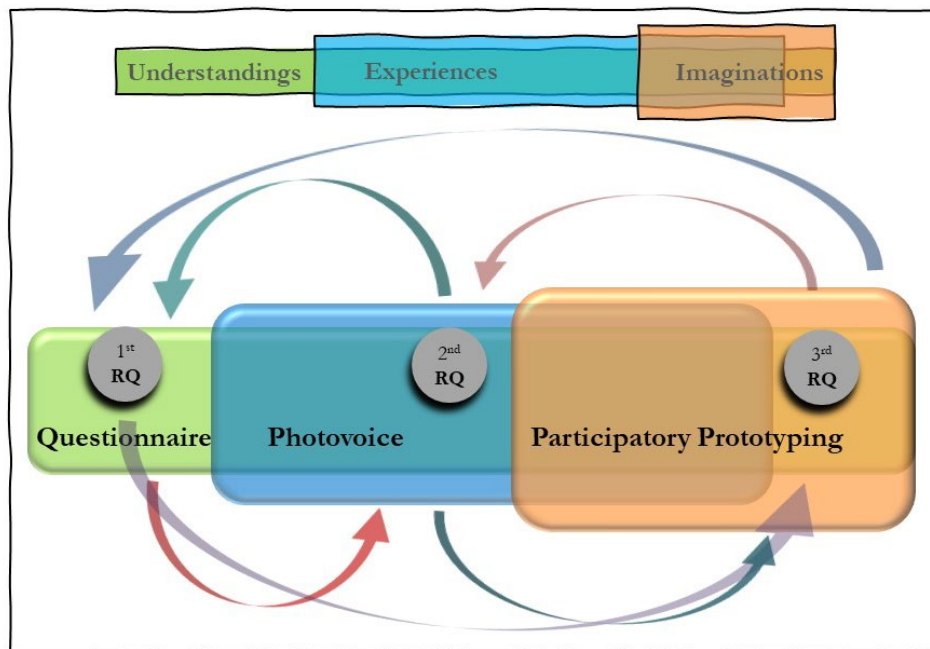


Figure 5. A schematic overview of the sequential yet overlapped phases of the study

PARTICIPANTS

Doctoral students from The University of British Columbia (Okanagan campus) participated in this research. Thirty-eight individuals accepted the recruitment invitation and participated in the first phase. Participants in the second and third phase, eleven and twelve people respectively, emanated from the original thirty-eight. There was no chance to select a sample that represents the diversity of participants coming from different departments and fields of study, or cultural background. Luckily, students, who decided to participate were from different departments and included both domestic and international students. Table 2 shows the detailed information about participants demographic.

Table 2. Demographic of participants

First phase: 38 participants (P1-P38)		Second phase: 11 participants (P1-P11)		Third phase: 12 participants (P1-P12)	
Age	No	Participant	Description	Participant	Description
25-34	18	P1	25-34, 1 st year, Electrical Engineering, International, no office	P1	25-34, 1 st year, Electrical Engineering, SOE International, no office
35-44	12				
45-54	5				
55-64	3				
Program		P2	25-34, 1 st year, Arts (Interdisciplinary), International, no office	P2	25-34, 1 st year, IGS, FCCS, International, no office
Engineering	10				
Interdisciplinary	18				
Communications	4				
Chemistry	1	P3	55-64, +4 th year, Education, Domestic, with office	P3	55-64, +4 th year, IGS, OSE, Domestic, with office
Psychology	2				
Health and exercise sciences	1				
Philosophy	1				
Biology	1				

First phase: 38 participants (P1-P38)		Second phase: 11 participants (P1-P11)		Third phase: 12 participants (P1-P12)	
		P4	35-44, 3 rd year, Arts (Interdisciplinary), International, with office	P4	35-44, 3 rd year, IGS, FCCS, International, with office
Stage	No				
First year	8				
Second year	18				
Third year	4	P5	25-34, +4 th year, Civil Engineering, International, with office	P5	25-34, +4 th year, Civil Engineering, SOE International, with office
Fourth year	6				
More	6				
Graduated	4				
		P6	35-44, 3 rd year, Psychology, Domestic, with office	P6	35-44, 3 rd year, Psychology, Domestic, with office
		P7	45-54, 2 nd year, IGS (Communications), Domestic, no office	P7	45-54, 2 nd year, IGS (Communications), Domestic, no office
		P8	35-44, Graduated, Social Science, International, no office	P8	35-44, Graduated, Social Science, International, no office
		P9	35-44, Graduated, Mechanical Engineering, International, with office	P9	35-44, Graduated, Mechanical Engineering, International, with office
		P10	35-44, 2 nd , Natural Science International, with office	P10	35-44, 2 nd , Natural Science International, with office
		P11	55-64, 3 rd year, Education, Domestic, with office	P11	55-64, 3 rd year, Education, Domestic, with office
				P12	25-34, Graduated, Civil Engineering, International, with office

RECRUITMENT AND ETHICS MANAGEMENT

I invited doctoral students and alumni of a research-intensive Canadian university (The University of British Columbia, UBC) to take part in this study. The invitation letter outlined an explanation of purpose of the study and research procedure, as well as the benefits and risks of the study. The University's Graduate Community Facilitators and the Alumni Association representatives distributed the link to the potential participants via their email lists and their LinkedIn private groups. Sending out up to three follow-up emails, thirty-eight participants including thirty doctoral students and eight alumni agreed to participate in the first phase of the study. Participants of the second and third phase, eleven and twelve people respectively, were from the original thirty-eight.

I explained to participants that they can post photos of their prototypes, sketches, and notes anonymously or they can choose to put their names through logging in to the platform. I also reminded them of their authorship of their photos, prototypes, and sketches during the process and in the consent forms that they signed.

Consent was considered as a layered and an ongoing process; this means the initial consent allowed me to proceed with the study, but participants confirmed the consent in the next phases through an informed consent form related to each phase. I also reminded the participants that at any level, they could withdraw any time from the study without any repercussions.

FIRST PHASE: QUESTIONNAIRES TO ADDRESS SUBJECTIVE ASPECT

This phase aimed at reaching the area that corresponds to the explicit knowledge (Sawhney et al., 2003) of doctoral students on learning spaces, and the objective was to explore how they perceive, identify, and interact with their learning spaces — including conceptual, personal, social, virtual, and material spaces. An adaptation of Lefebvre's (1991) perceived space in this phase was helpful in capturing something of perceptions and experiences of students in relation to their learning spaces during their doctoral experience.

Many qualitative researchers who tend to identify qualitative research with inductive/open-ended surveys (Jansen, 2010), exclude pre-structured questions in qualitative questionnaires. However, in this qualitative study, I included pre-structured/deductive statements into the area of qualitative questionnaire as they were concerned with diversity as opposed to numerical distribution. The complex multi-layered definition of learning space in the context of doctoral education did not allow starting with open-ended questions to explore students' perceptions of learning spaces; participants needed some clues to start thinking about the concept. The open-ended question after each statement provided an opportunity for participants to clarify and/or justify their responses. The questionnaire also included open-ended questions for additional thoughts and comments (see Appendix). It is worth mentioning that, in this qualitative study, the aim of the questionnaire was not establishing frequencies, means, or other parameters but determining the diversity of the choices within the given population. Jansen (2010) called this method qualitative survey and explains, "[t]his type of survey does not count the number of people with the same characteristic (value of variable) but it establishes the meaningful variation (relevant dimensions and values) within that population" (p. 3).

Data from this phase were visualized quantitatively through simple sunburst graphs and bar charts in order to summarize the findings, and then, the charts were interpreted and described qualitatively. Sandiford and Ap (2003) clarified that if we consider participants to respond to qualitative options, words that best match their opinions, feelings, experiences, or their attitudes, the nature of Likert data must be seen as a quantitative representation of a qualitative notion. Johns and Lee-Ross (1998) confirmed that, in such case, any analysis of the Likert Scale data should be conducted with care and recognize the importance of its qualitative aspects.

SECOND PHASE: PHOTOVOICE TO ADDRESS OBJECTIVE ASPECT

This phase aimed at reaching the areas connected to students' tacit knowledge on learning spaces and how they use the existing provided spaces in everyday basis. It also corresponds to *conceived space*, the conceptualized space by planners which attempt to describe patterning of the social in space.

To avoid a researcher-centered approach in this phase, I applied Photovoice as a visual storytelling method through which participants reflected on the problems and strengths of their learning spaces that might have been difficult to conceptualize or express in the questionnaires. It provided a chance for participants to express their experiences in relation to their learning space visually and verbally through taking photographs and reflecting on the photos in the subsequent interviews. In this project, the use of photography helped me explore students' perceptions and experiences of the spaces in which they learn; it also provided me with an opportunity to gain a more complex view of the spaces that research participants have been experiencing.

In this phase, Photovoice was applied as a methodology that (1) enabled students to record aspects of their doctoral experience, (2) provided opportunities for doctoral students to reflect on their photographs that mirror the realities of their learning spaces influencing their doctoral experiences, and (3) used photography to catalogue doctoral students' learning spaces issues in the hope of influencing university's informed and principled decisions in the future.

Participants took photos of what they identified as their learning/research spaces and provided a brief written description for each photo. Then, they were invited to a semi-structured interview to explain more about their photos.

Combining C. Wang's (1999) approach and Goodhart's et al. (2006) suggested steps for Photovoice projects, I facilitated a process that included:

- Introducing Photovoice methodology to participants and explaining ethical considerations during the process of taking photos;
- Obtaining informed consent to use of their images;
- Providing four weeks to participants to take photos; and
- Taking part in a semi-structured interview to discuss their photos, which was scheduled at their convenient time.

The interviews were conducted to give an explanatory picture of the situation and to provide the study with in-depth understandings of doctoral students' experiences about their learning spaces. The interview protocol was developed to ensure that interview questions align with second research question, investigating the relationship between students' identified learning spaces — Lefebvre's (1991) *perceived space*— and the university's learning spaces — Lefebvre's (1991) *conceived spaces*, and to construct an inquiry-based conversation (Castillo-Montoya, 2016).

Creswell's (2007) approach in qualitative inquiry along with Horwitz's (2012) work with Photovoice were integrated to design a draft of open-ended questions for the semi-structured interviews and facilitate a process of thinking through which photographs reflected participants' experiences within their learning spaces. In addition, participants' comments and written explanations in the surveys created a context and guided asking the interview questions. The emerged themes from the first phase facilitated the discussion in the semi-structured interviews.

Borrowing Capous-Desyllas and Bromfield's (2018) major levels of analysis, data from this phase was analyzed through three major levels: (1) an analysis of each participant's transcript, (2) a cross-case analysis comparing all transcripts together, and (3) creating visual art to gain a deeper understanding of the transcript data and corresponding photographs.

THIRD PHASE: PARTICIPATORY PROTOTYPING TO ADDRESS CO-CONSTRUCTED ASPECT

Co-design often builds on the tradition of (Scandinavian) participatory design. However, Sanders and Stappers (2008) referred to co-design as “any act of collective creativity, i.e., creativity that is shared by two or more people” or “the creativity of designers and people not trained in design working together in the design development process” (p. 6). Sanders (2013) proposed prototypes as an important means of bringing ideas into the world through different forms. Typically, a prototype is concerned with developing “an idea about a product, system, or service to meet human needs and devising a plan for executing that idea” (Binder et al., 2011, p. 68).

Co-prototyping aimed at reaching the areas connected to students' latent knowledge on learning spaces and how they might imagine the future of learning spaces. It also corresponds to *ideational space* (Lefebvre, 1991), the space of the inhabitants and users that can be altered by ordinary people through their imagination towards transforming the space. Co-prototyping aimed to (1) enable doctoral students to take an active part in the research and innovation process, (2) identify latent needs of doctoral students in relation to their learning spaces, and (3) let the participants leverage on their imaginations and experiences to proactively propose potential design solution(s), which has to be translated into suggestions and principles and ultimately address the needs of doctoral students' community.

To develop the prototyping process, I drew from a framework suggested by Sanders et al. (2010), which includes three dimensions: form, purpose, and context. Form describes the action that took

place, and, in this case, it is described as making and/or telling/writing. Purpose describes why the tools and techniques are being used. Context describes where and how the tools and techniques are used. The prototyping process took place in a format of online studio adopting an open approach to innovation. The overall mindset with which the participatory prototyping is conducted characterized by the belief that all people are creative (Sanders et al., 2010).

Based on the framework upon which the virtual prototyping was developed, I designed a toolkit considering the entire experience that the participants were going to go through. I organized a toolkit, a collection of tools and techniques, and explained how the tools could be put into action. Participants were provided with flexibility to sort, categorize, and prioritize the tools and techniques to make rapid prototypes.

To explain how to participate in prototyping and prime participants to execute the activity, I created a video using Video Scribe. I used Padlet, which is an online post-it board/platform to share ideas and collaborate.

Figure 6 shows a few captured screens of video Scribe video that I created to explain the process.

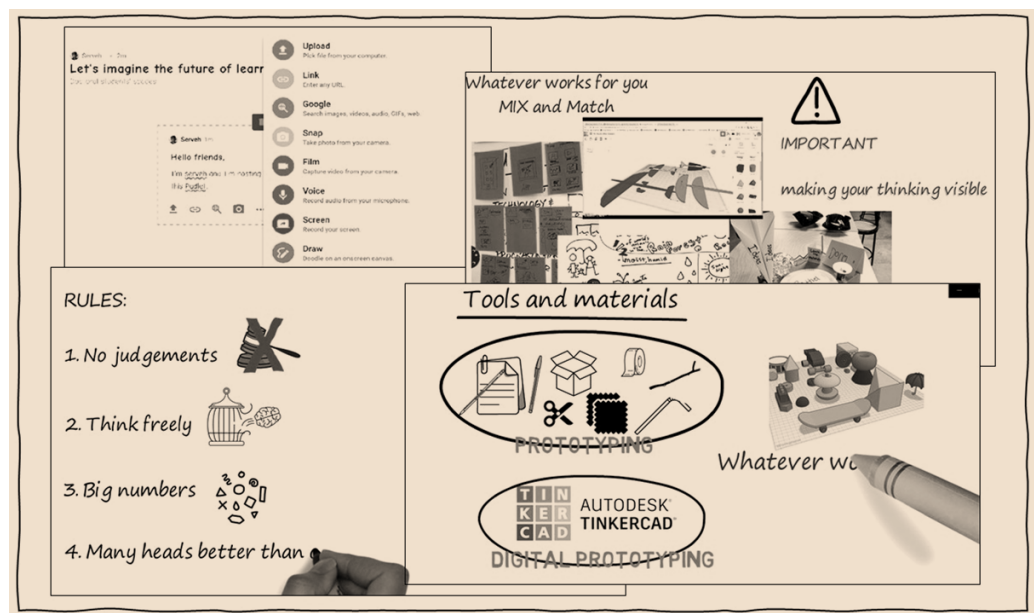


Figure 6. Captured screens from Video Scribe, whiteboard animation video

The analysis consisted of two main interrelated steps: participants' productions (two- and three-dimensional prototypes) and their associated narratives. The aim was to include participants' contributions from a perspective that goes beyond the limits of verbal language (Jewitt, 2013; Malinverni et al., 2019) and to better understand the meaning of what participants created using different resources and materials. Analysis, therefore, took place in a process of coding the data without trying to fit them into the pre-existing coding frame from the previous phases, or/and the theoretical framework of the study.

AN ECLECTIC THEMATIC ANALYSIS-INFORMED APPROACH

DBR created an opportunity for an exploratory and retrospective process. The dialogic approach to data collection and analysis highlighted the complicated relationship between the literature and data. This flexible approach was adopted from DBR and provided an opportunity to see areas in which I lacked needed data, realizing that my data had gaps.

A combination of interconnected strategies for analyzing the data was applied in this study. While Thematic Analysis (Boyatzis, 1998; Braun & Clarke, 2006; Roulston, 2001), as the general method,

informed the data analysis process at all stages, complimentary strategies were integrated to each phase when needed; reflexive iteration and axial coding in questionnaires analysis, reflexive iteration, axial coding, and art-informed approach in Photovoice, and reflexive iteration and art-informed approach in participatory prototyping (Table 1). The benefits of using such an eclectic approach included cross-disciplinary non-linear investigation, creating a complete picture of participants' knowledge obtained in different levels, enhancement of trustworthiness and rigor, and building a creative medium to interpret the data.

CODING THE DATA

As Saldana (2013) explained, coding is a heuristic process that allows for fluidity ensuring the process is alive and organic. Through this process, I considered the possibility of various understandings emerging from reading the data and reflecting on existing themes and ideas based on theoretical framework. At the same time, I attuned the emerging themes to my personal interpretations of what I was reading. This approach, which is inherent of qualitative analysis, influenced how I noticed the patterns shaping analysis of the data (Charmaz, 2006; Saldana, 2013).

Being informed by Thematic Analysis, data from each phase was analyzed through iterative cycles of coding, going back to the data and re-coding based on emerging codes, albeit Srivastava and Hopwood (2009) reminded us that codes and themes do not emerge on their own. They are driven by what we, as investigators, want to know and how we interpret the data based on theoretical framework, our ontological and epistemological assumptions, our subjective perspectives, and our intuitive understanding of the field.

After the first cycles of coding in each phase, axial coding as a second cycle method was employed to find bigger-picture ideas through concepts that link across the data sets (Strauss, 1987; Strauss & Corbin, 1998). Through axial coding, I explored how the existing and emerging themes relate to each other within different phases of the study.

Since this study was conducted as doctoral research, coding the data and identifying the themes were conducted by one person. The analysis was then discussed with a supervisory committee. Although this process allows consistency in the method, it fails to provide multiple perspectives from a variety of people with differing perspectives. When using this method for any other studies in the future, the coding of data should involve several individuals with themes' being developed using discussions with other researchers.


As an example of coding process, Table 3 shows the emerged codes from the questionnaires, which were clustered into themes providing areas for responses to the first research question. The emerged codes and themes guided the discussions in the interviews and the prototyping process in the next phases.

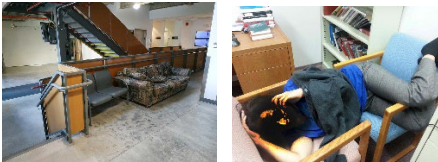
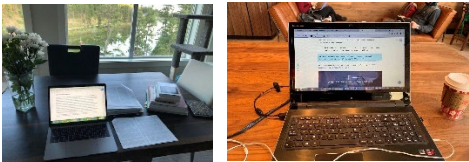
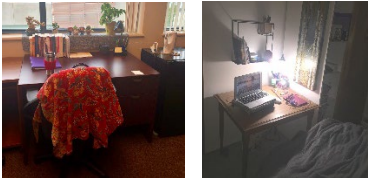
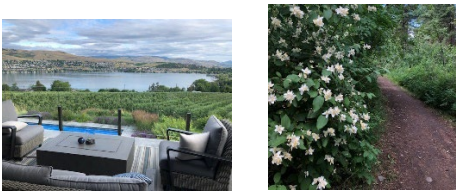
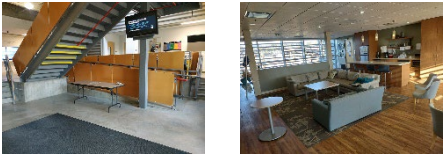
Table 4 represents initial codes emerged from iterative readings of each participant's transcript along with the axial codes linking the codes across the data set, which are categorized into themes. I included a few related photos taken by students, which helped facilitating my conversations with participants.


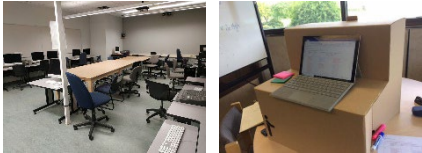
Table 3. An example of codes and themes from questionnaires

Research Question	Codes	Themes
First research question Doctoral students' perceptions about learning spaces	Beyond physical settings; conceptual space unique to each person; access to literature/publications; new environments to get new perspectives/challenge assumptions; meeting with supervisor	Beyond physicality of space
	Making space everywhere; turning a space into a place; potential for choice;	From space to place
	Configurable/customizable; physically flexible; affordances; home-like	Configurability
	Graduate/academic communities; interdisciplinary space on campus; faculty specific social spaces; peer communication	A nested community of practice
	Solitude and reflection; emotional needs; Nature to foster mood; a place to plant one's self; less isolated; no cellphone reception; Indigenous ceremonial learning	Well-being
	Solitude and reflection; private and quiet spaces; offices for graduate students	Personal spaces

Table 4. Codes and themes emerged from Photovoice data

Research Question	Codes	Themes
	Too many students in an office; Displacing students; Prioritizing students; Squeezing students; Distracting office space; Not provided offices; Distracting; Overcrowded 	Lack of office spaces

Research Question	Codes	Themes
<p>Second research question</p> <p>Doctoral Students' experiences of learning spaces</p>	<p>Not having the “own” space; Locked door no distraction; You are not in anybody’s space; The majority of everything that the university can offer</p> 	<p>Need to have “own” space</p>
	<p>Opportunity to multi-tasking; Cooking while working; Kitchen table with nice natural view; Access to online resources</p> 	<p>Access to virtual spaces</p>
	<p>No personalized space to feel belonged; Looking for a space; Stuff that aren’t mine; A poem on the wall; Favorite candies on desk; Making “my” space; My blanket on my chair</p> 	<p>Sense of belonging by having own space</p>
	<p>Natural light/window; Walking pedagogy; Lying down on lawn when read something</p> 	<p>Closeness to nature promotes well-being</p>
	<p>Making a space under the stairs; Nobody sees you; Nobody is behind you; Feels “homy”; Comfortable, quiet convenient home office</p> 	<p>Need for home-like Intimate spaces</p>

Research Question	Codes	Themes
	<p>Small conversations; Bringing appliances from home to share food; No funding to buy microwave/kettle for lab; Bringing tea/coffee for research group; Indigenous thinking: things are shared in a circle</p> 	<p>Sharing/making space Sense of community</p>
	<p>Doing different tasks; Alter the space to your needs; Furniture not conducive to moving around; Let me pick and choose; Ability to re-arrange my space</p> 	<p>Potential for choice/Reconfigurability</p>

The content of the postings on the Padlet platform in prototyping phase was analyzed using thematic coding, similar to what I have explained in the Photovoice and questionnaire analysis. Using inductive and latent Thematic Analysis, coding and theme development were directed by the content of the data and the underlying assumptions of what participants expressed. In coding, I considered both common codes and outlier or uncommon codes; due to the creative and imaginative nature of the exploratory process, the outlying responses contained original or unique ideas.

Figure 7 shows the process of coding and theme development through iterative inductive and latent Thematic Analysis; the process started from coding in each participant's work and then, linking the codes across the data set to develop themes.

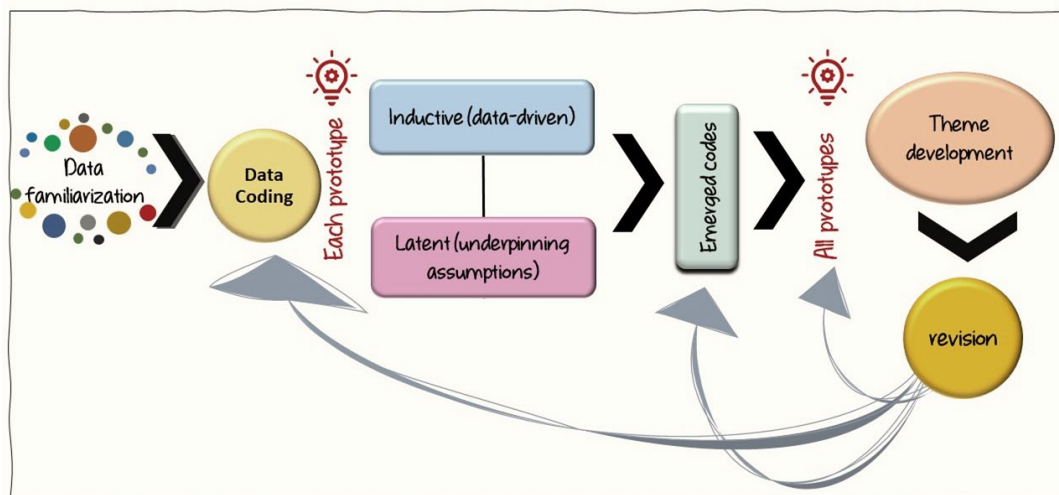


Figure 7. Coding and theme development strategy

Writing the results was conducted also in reflective and iterative cycles. As the findings were written up, analysis continued with reflection on the results, returning to the analysis, writing up some of the findings, reflecting to the results, and so on. Braun and Clarke (2006) supported this approach within Thematic Analysis and consider writing as an integral part of analysis, not something that takes place at the end as it does with statistical analyses.

Figure 8 shows the emerged codes from participants' prototypes and their textual explanations (inductive coding) and the axial codes, which help me cluster the codes into categories.

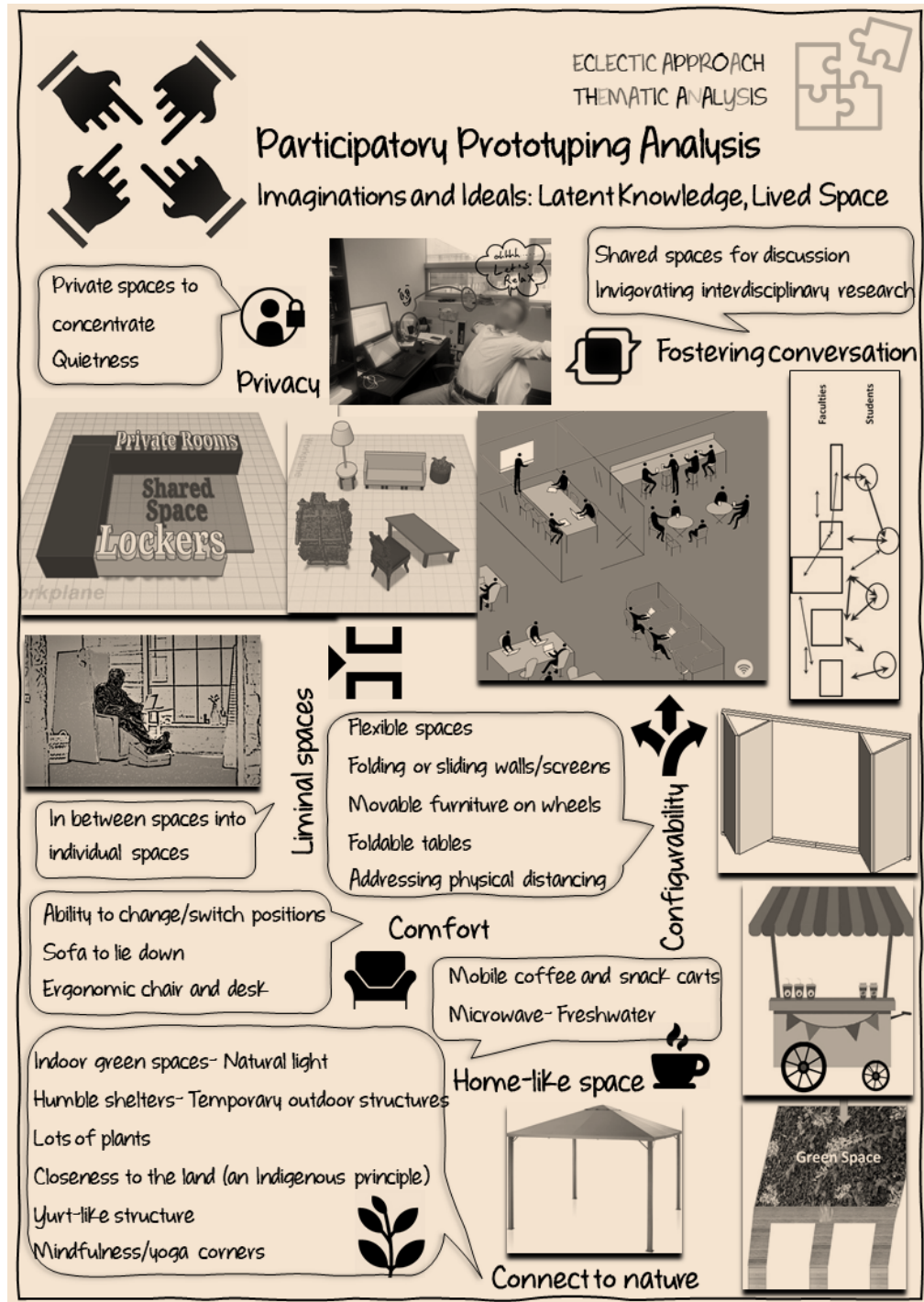


Figure 8. Prototyping analysis collage, inductive approach in Thematic Analysis

METHODOLOGICAL ISSUES

This study was conducted with a small number of voluntary participants, which therefore limits the types of generalizations that can be made. Moreover, any educational institution is part of a wider, dynamic web of cultural and social aspects, which requires contextual investigation to unravel the complex relationship of space and learning in each context. The theoretical and methodological process of this study could be used as a guideline for other institutions' explorations rather than the findings.

The qualitative nature of this study and the relatively subjective nature of data makes the analyses methodologically questionable. Although I incorporated open-ended questions in a certain number of statements in the questionnaire, there was little chance for conversation and allowing the participants to make meaning of why they agree or disagree with the statements. This issue somehow resolved with the participants who participated in the semi-structured interviews in the next phase. In the interviews, I went back to the questionnaires and asked participants for more explanations when needed. Jansen (2010) confirmed that well-performed interviews or observations may produce valuable knowledge by validity checking through replicating or triangulating. Confronting this issue, the resultant data from the participants who did not participate in the next phases could hardly be seen reliable.

Another issue relates to coding and analyzing the data. There are guidelines for coding provided by qualitative researchers in the literature, which have been helpful technically. However, as Jansen (2010) declared, the quality of coding is not a technical methodological issue; it involves theoretical sensibility and creativity, which is subjective to the researcher. Similar to any other qualitative study, my worldview, values, and perspectives have influenced the interpretation of findings.

Other dilemmas arise when using Photovoice as a tool to evaluate community assets and address their needs. As C. Wang and Burris (1997) noted, photographs are easy to gather but difficult to analyze and summarize because they provide a very large quantity of complex data that can be difficult to digest. In order to create a more comprehensible data and ensure as much validity as possible and to gain as much insight as possible, triangulation was applied in this phase. Overlapping the data collection and analysis method allowed verification of data. Comments that provided in the previous phase by each participant was verified and discussed in the semi-structure interviews. Meanwhile, exploring choices in taking photos in Photovoice phase led to new areas for dialogue as well as production and exchange of ideas in the next stage.

Political, theoretical, and practical aspects of participatory design involve issues and concerns: the politics of design, the nature of participation, and methods, tools, and techniques for carrying out design projects. Robertson and Simonsen (2012) noted that participatory design is a political process involving different conflicts and dilemmas. Considering the political issues involved in participatory design in different levels, engaging students in experimental practices of innovation and future making in learning space context can bring new meanings and forms of students' involvement in the ongoing process of learning space development.

DISCUSSION OF FINDINGS

Findings from the three phases of this study generated some responses to the research questions. Drawing on Design-Based Research as an underlying methodology of this research, design principles, or simply lessons learned (Van den Akker et al., 2006), were derived from the findings. The design principles helped develop *domain theory* including a descriptive analysis of the area of the problem.

Since design knowledge is contextual and active, constant exploration is required to refine the design process as well as the design principles. Findings from the three phases generated some responses to the research questions, which are summarized in Table 5.

Table 5. Findings from three phases answering research questions

Subjective aspect (1 st Q) Space as Perceived	Objective aspect (2 nd Q) Space as Conceived	Co-constructed aspect (3 rd Q) Space as Lived
Beyond physicality: multiplicity of spaces for multiple identities	Lack of personalized space	Physicality
Individual space, a necessity in any PhD journey	Lack of community and connection with peers	Liminality
Social space, community as a missing vital layer of space	Lack of spatial affordances	(Re)-Configurability
Virtual space, still an ill-defined space		

PERCEIVED SPACE: FIRST QUESTION

Boddington and Boys (2011) reminded us that learning space is a combination of institutional ideas, the socio-spatial practices occurring in them alongside the individual perceptions and practices within the spaces. The perception of learning space, that the first phase of this exploration was embedded in, represents the accumulation of multiple person-space-learning relationships that are mediated by culture and identity of different departments and individual ways of learning. Despite the different perceptions, the consensus among doctoral student participants from different disciplines was that “learning happens everywhere.”

Doctoral students’ perceptions in my study further reinforced Lefebvre’s (1991) perceived space in which space is subjected to the social practice, experiences, and interpretations of the people who use the space. The diverse practices that happen within the spaces are under constant changes and the usages are subjected to the experiences and interpretations of the users. Participants of this research perceived learning spaces beyond their physicality; a learning space to participants was understood both as a physical and a conceptual entity. Also, considering the complex interplay between individual, environment, and community (Swist, & Kuswara, 2016), the relationship between the personal, social, and material space tended to be a dynamic and unfolding interrelationship.

The concept of perceived space (Lefebvre, 1991) is under constant changes based on experiences and social practices of the space inhabitants. Participants completed the questionnaire before the COVID-19 outbreak, while I collected data for the last phase of this study at the beginning of COVID-19 outbreak in a virtual environment. Since then, virtual spaces started to grow at an unprecedented rate and became inevitably vital spaces for the current (or maybe future) time(s), albeit at the first and second phases of the study, participants did not give the same value as the physical spaces and their potential to create communities. Virtual communities are being defined using current networked technology, while communities of practice emerge within those communities. Bringing the current network technology into teaching and learning context more than ever, has both advantages and disadvantages in emergent development of communities of practice, which constantly needs cautious and close investigation.

In today’s unpredictable world with increasingly development of technology and the need for virtual spaces, which has brought “new types of visibility, literacy, pedagogy, representations of knowledge, communication and embodiment” (Savin-Baden, 2007, p. 13), the development of a sense of place and the connection of experiences through social and cultural interactions are fundamental to think about learning space as a *spatial ecology*. Savin-Baden (2019) claimed that special ecology is a living, fragile, and adaptive entity. There is a need for new strategies to operate the potentials of online learning both in formal and informal settings.

In addition, to prevent disease transmission, physical spaces have been the subject of radical changes allowing physical distancing. Further exploration is required to investigate how COVID-19 circumstances have impacted students' perceptions about their learning spaces, which is beyond the scope of this study.

Along with the need for individual spaces, participants repeatedly mentioned the importance of being part of scholarly communities during a doctoral journey. What was perceived most was the social aspect of space where conversation with peers and creating communities is possible. Participants felt that, however, they did not have enough opportunities to get involved in those communities as much as they should. One participant, who was about to graduate, complained,

[f]or the most part, peer engagement is crucial, and often missing in grad studies. I do not think we have enough real dialogue space for students to gather and share. It is the nature of grad studies, but it is hard to get those connections.

Participants of this study also mentioned that they often chose campus physical spaces to use the social resources to their research-related tasks; one of them said that he felt more supported when he works on campus. Participant 9 explained his experience and the need for physical spaces to interact with peers:

In doctoral process, you work for a couple of years and the outcome starts coming out and you see it in the last part of the process. It is not a short-time rewarding work. When you work from home and you are not surrounded by your community, simply you can lose motivation and the meaning of the work that you are doing. It is not always easy to work from home; that's why I believe we need spaces on campus to work, have discussions, and motivate each other directly or indirectly.

Other participants, who choose to work at home, often seek solitude to accomplish a task since they did not have a space on campus or the shared offices were overcrowded and noisy. In addition, international students, who were not privileged to have a proper space at home, felt the need to have a space on campus more than local students, who had established homes with a corner or a room to work/study. An alumnus elucidated,

International students deal with many issues. They pay more tuitions and the hours that they are allowed to work are limited. Money is a big issue. They mainly rent smaller places or share rooms. So, they don't have a comfortable proper space at home to work. They need offices on campus.

Doctoral students, who participated in this research from different disciplines, expressed the necessity for individual spaces to support reflection and writing hours. The intensity of their writing hours increases as they get closer to the end of their doctoral program. Despite the importance of such spaces in doctoral students' lives, participants expressed their dissatisfaction about not being provided a (quality) space. One of them clarified that they provided with a shared office where "too many people squeezing into a tiny space", which is likely to increase levels of disruption and frustration.

CONCEIVED SPACE: SECOND QUESTION

Lefebvre (1991) identified conceived space as "the space of scientists, planners, urbanists, technocratic subdividers and social engineers" (p. 38). We can gain insight into the conceived spaces for learning in any context by investigating how learners experience such spaces and interact with them.

The use of photographs to picture and document personal experiences of learning spaces and the subsequent process of sharing and discussing the photographs allowed the group of doctoral students, and me as the facilitator of the process, to explore the multiple meanings and facets of learning spaces, a seemingly obvious concept.

To some viewers, at first glance, the images might not appear to portray a learning space. For example, a photograph of a random couch under the stairs may not trigger thoughts of learning space without the story behind it, which was explained by the participant who took the photo. In the interview, they clarified: “I like this area when the couch is here because you get to see who is coming and going, is open to casual meetups without ever having an excessive amount of foot traffic, and it is near the gallery, and is never loud or crowded.” Participants’ descriptions of personal experiences and intention underlying each photo evoked intriguing and in-depth discussions about learning space.

The conceived space, which is the mental image of the spaces, tends to be expanded based on university’s negotiations with students to fulfil their needs. A new building on campus, for example, was launched during this study but, participants did not reflect on their experiences with those spaces as they did interact with the spaces at the time of data collection. Physical spaces are under constant development and change based on university’s strategic plans. As a result, continuous and timely review of the spaces to inform the evaluation and usability assessment is required.

Photovoice provided a process for students to amplify their voices to influence to shape future learning spaces and qualitative data from this phase uncovered themes and patterns including lack of personalized space, lack of community and connection with peers, and lack of spatial affordances.

Since PhD students generally spend several hours a day working on their projects, they needed personalized spaces and elements as reminders of who they are aside from their work. One of the interviewees, who came from an Indigenous background, put a blanket on their chair in a shared office on campus and said:

Our desks show our personalities. The blanket is really important for me. That was one of the things that I brought with me when I first moved to Canada. It is important for me to have that here. It is important that my culture is there, and I have a reminder of where I came from with me in my office... it is motivating me for my project... kind of energizing me for what I do. It makes my desk ‘my desk’. I guess that’s important to have that space. It is very helpful. Definitely, it’s good for your health mentally. Also, to have a space to claim.

Students, who did not have a space on campus, were constantly grappling with finding an individual space on campus. One of the participants believed, “Space is one of the elements that can convey a message. When students do not have the space that they need and they deserve, they feel ignored.”

Participants believed that space is an indicator of support and the way that the program is treating the grad students and research. An alumnus, who experienced lack of space as well as community during their PhD, declared, “I’m not talking about just adding fancy chairs or desks; what is much more important is that you get support from the community that you work in and you can support other to survive and thrive in PhD.”

Despite the strong desire for social aspect of learning spaces expressed by doctoral students, they felt that supports from the university have been inadequate. One of the interviewees (P11) explained this problem,

It is the most isolated learning in my life. I think that’s why most people pull out. It’s become too big. The reality is there is no connection between us and other learners. I don’t think the coursework provided this opportunity.

As declared by Lefebvre (1991), space and the people who inhabit the space are not separated. In the context of doctoral studies, participants of this study also emphasized the importance of interactions within the learning spaces, which give rise to the institution’s community; they implied creation of communities can turn an existing space into a place. Temple (2009) noted “[t]here is an interaction between space and the university community, during which both are changed”.

LIVED SPACE: THIRD QUESTION

Lefebvre (1991) criticizes the domination of conceived space over space as lived. Lived space, as Gardiner (2002) explained, is “where essential human desires, powers and potentialities are initially formulated, developed and realized concretely” (p. 75). However, space, as Lefebvre argued, is always produced trialectically through perceived, conceived, and lived processes.

Lefebvre’s lived space embodies symbolisms linking to what is hidden. Savin-Baden (2007) confirmed the notion of lived spaces is symbolized by activities that occur in them, while at the same time they portray complexity and symbolism. Lived spaces might be adjusted due to circumstances. However, this understanding of representational (lived) space could be problematic when the change is not recognized by all who utilize that space.

Prototyping helped participants to make their thinking visible and express their imaginations to shape future possibilities for learning spaces. Learning spaces of doctoral students have been made up through a three-way dialectic between perceived, conceived, and lived space, the senses, physical movement, and imagination. The qualitative data derived from students’ imagination and ideals unraveled possibilities for future learning spaces of the campus. The main themes emerged from participants’ ideas included physicality, liminality, and (re)-configurability of space.

Regarding physicality of learning spaces, participants imagined comfort, quietness, privacy, living-learning spaces (home-like comfort), and technology support as well as spaces that foster conversation. They envisioned the future spaces as a balance between individual and collaborative spaces. In fact, they imagined freedom and choice based on their learning styles and their needs to accomplish different tasks. Explaining their prototype (Figure 9), Participant 8 said, “[in this setting, you have both private space when you need to concentrate and also a shared space when you want to discuss or hang out with your peers!” Participant 12 added, “when I think about learning space, three things come to my mind at the first place (QCB): Quietness, Comfort, Brightness.” Emphasizing the home-like spaces, Participant 10 noted, “I prefer to switch my study positions from time to time. For example, after sitting behind the desk for a while, I mostly prefer to lie down on the sofa”.



Figure 9. Turning an unused space on campus into a workspace

There are liminal, unused spaces in all buildings, whether we are aware of them or not. Corridors and stairwells, for instance, as places of chance meetings, welcome and unwanted as well as places for learning. What students suggested was to re-use or re-purpose the unused existing spaces. They believed if spaces are flexible enough, they can arrange things in their own ways pushing the boundaries. As Hunt et al. (2012) mentioned, this process is not always predictable and does not necessarily align with what has been designed, but “if there is sufficient flexibility, the learning space will enable innovation driven by imagination” (p. 189). Participant 10 explained:

I understand that the amount of space is limited to assign individualized spaces to all doctoral students; so, I thought we can turn any waste space on campus into a workstation. For example, under the stairs or corners of any building or window spaces. I would define spatial privacy and make a cozy/comfortable space, something like the one in the picture (Figure 9).

Participants' imaginations and ideals emphasized the flexibility and configurability of spaces to enable self-initiative. They felt that the ability to manipulate their spaces enables them to create the required spaces based on what they need in different situations. Acknowledging that any space can provide a good fit or a bad one to its inhabitants, Keppell et al. (2011) suggested "contents can rupture the container" (p. 25) while Bion (1984) claimed that the dynamic interaction of container and contained enables creative mental life. Participants expressed their interest in having option between private and shared spaces based on their needs (Figures 10 and 11 and bottom and top left notes in Figure 12) as well as flexible and reconfigurable spaces in different layers of space including the arrangement of private and collective spaces (Figures 10 & 11), layout of the space (Figure 11), and movable and folding walls and furniture and the flexibility of the affordances. In their two-dimensional prototypes, participants suggested flexibility of affordances thorough movable/folding walls and furniture (top left and middle notes in Figure 12). They also expressed the need to have access to snack and coffee in their learning spaces (bottom right note in Figure 12 & Figure 13).

Participants' perceptions, experiences, and imaginations about learning spaces emphasized the effective learning relates to well-being, belonging, and engagement that they felt support them in their studies. Providing them with a space to make it their "own intimate space" helped them feel more belong and reminded them of who they are; outdoor spaces, fresh air, natural light, and indoor plants can provide a space for solitude and reflection in order to "feel one-ness with nature" and "plant one's self," according to participants. Home-like spaces, kitchenettes, and sofas suggested a domestic space with sense of rootedness and familiarity.

This study has been partly conducted in the time of the COVID-19 pandemic and still so many uncertainties remain as educational institutions plan for the reopening of their buildings to students and educators. Rethinking learning spaces to prevent disease transmission, changes to the physical space will be necessary to allow for physical distancing. As a result, learning spaces will not be the same again. Configurability will be an important quality of space more than ever. Considering the ambiguous future and the restrictions that COVID-19 have brought during the past few months, one of the participants (P11) explained, "with emphasis on reconfigurable spaces, whether indoor or outdoor, many options are achievable. And, to address physical distancing into our future, this reconfigurable principle needs to be foregrounded."

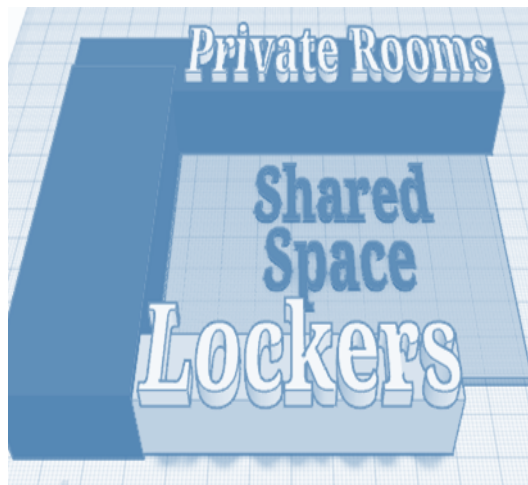


Figure 10. Private and collective spaces



Figure 11. private and collective spaces

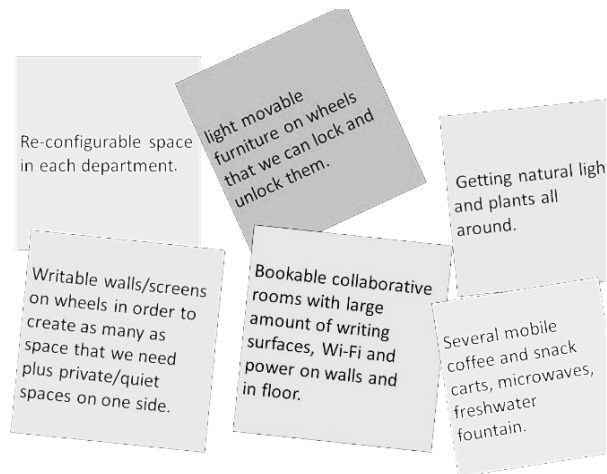


Figure 12. Participant's digital post-it notes



Figure 13. Movable coffee carts

FROM SPACE TO PLACE: COMPARING THE QUESTIONNAIRE AND PHOTOVOICE DATA

The premise of space and place used in this study is in accordance with Tuan (1977) where the meaning of place is situated and emerges from the distribution of space. As Tuan noted, '[w]hat begins as undifferentiated space becomes place as we get to know it better and endow it with value' (p. 6). Drawing on this interpretation, space is, therefore, a nominal, descriptive layer such as associating an urban space or learning space with its multilayered properties, while place is an interpretive and affective layer, addressing a sense of locality of where we live and that is familiar to us. Considering this assumption, what participants perceived as a learning space in the questionnaires is addressed as space and how they engaged with provided spaces in multifarious ways is identified as place.

In Figure 14, I visualize what perceived as space and what experienced as place based on data from questionnaires and Photovoice.

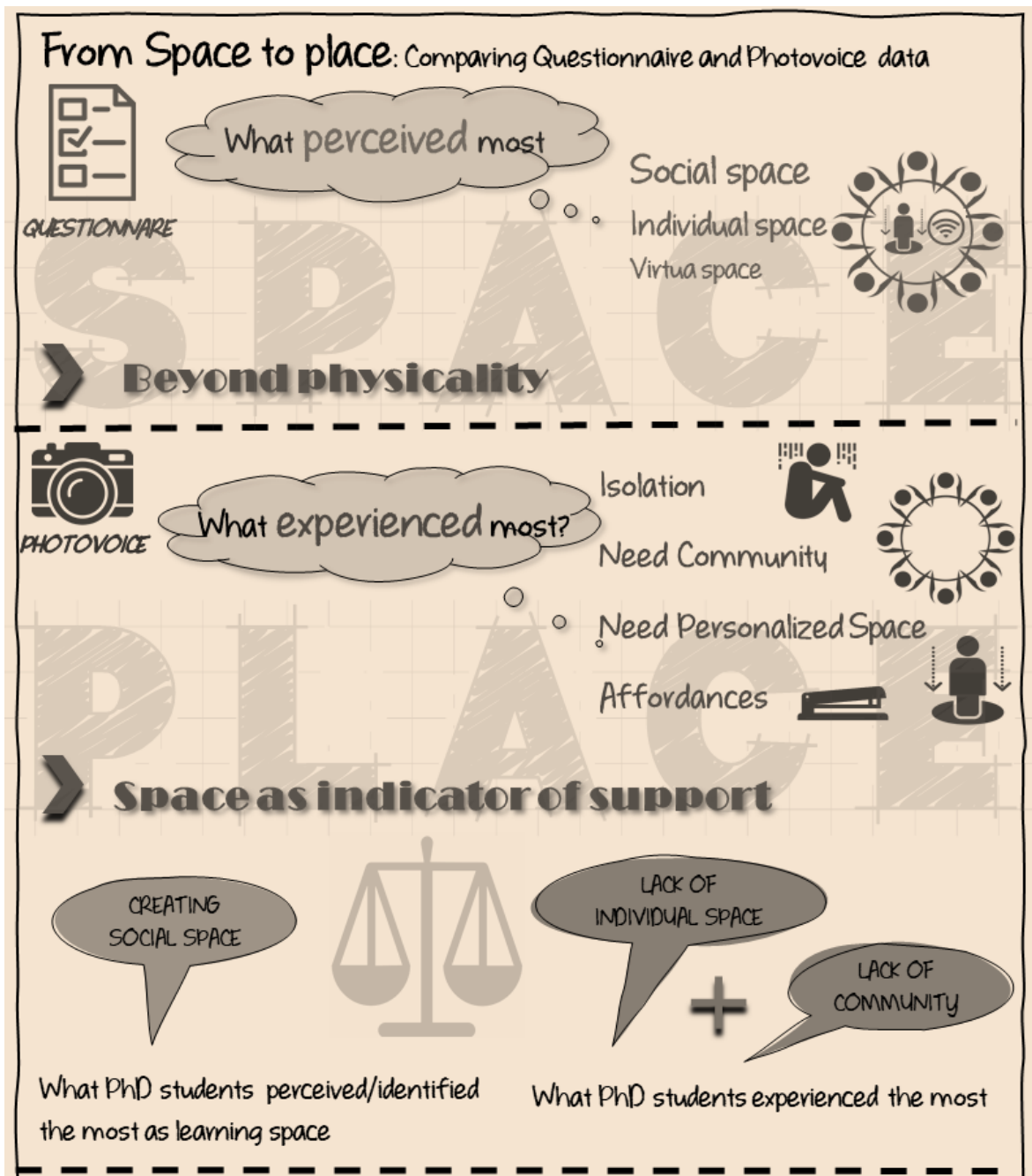


Figure 14. Comparing students' identified learning spaces and students' experiences

CONCLUSION

This study begins to open up the field of learning spaces in doctoral education to its complexities through integrating two views while offers a developing clarity that each focus can bring: (1) Lefebvre's conception of space (1991) that suggested investigating the interactions between occupants and space; based on this view, the societal production of space is a dialectical interaction between physical, mental, and social spaces; (2) Lave and Wenger's (1991) Situated Learning and Austin's (2009) communities of practice in doctoral education.

Drawing from this integrated framework, learning is always situated and embodied, not just in material space but also in individual, social and cultural contexts. Also, space can only be viewed in relation to its occupation, that is, as *socio-spatial* practice. Unpacking participants' perceptions, experiences, and imaginations of learning spaces through the three sequential phases of this study, the emerged themes revealed multiple, layered, and dynamic components of learning spaces and the relationships through which learning and space intersect.

Lefebvre (1991) argued that space does not simply exist as a given; it is always produced. The modes that he suggests help us think through the complexity of how all spaces are produced. To explore learning spaces from a Lefebvrian perspective, it was necessary to explore the *production* of such spaces considering the complexities of social reality and avoiding binary thinking about learning spaces (for example formal vs informal spaces). Careful attention to the *perceived*, *conceived*, and *lived* spaces, respectively related to students' perceptions (questionnaires), experiences (Photovoice), and imaginations (prototyping) of doctoral students elucidated how learning space for doctoral education is *produced*.

In addition to the relationship of learning and space, which is complex and interactive, a particular educational institution is part of a wider, dynamic web of social, cultural, and political aspects. The multi-faceted layered learning spaces reflected by participants allow envisioning the spaces in-between the students' routines and socio-spatial practices and the conventional and institutional spaces. The resulting pattern in each context is what Geertz (1973) called a *thick description*; it is a rich and layered account that may not result in design solutions or conclusion in short term but can illuminate our decision-making.

Figure 15 summarizes contributions of this research to the literature, outlines the lessons learned, and sums up the recommendations. Future research might consider conducting longitudinal research on learning spaces through identifying the interactions between learning space and learning both in undergraduate and graduate settings in order to view the campus as a whole through a *spatial ecology* model (Savin-Baden, 2007). It might also examine a participatory approach to design and research on learning spaces around parallel partnerships with other research-intensive universities, U15 (Group of Canadian Research Universities, 2017) and U21 (the leading global network of research universities for the 21st century) in which The University of British Columbia (UBC) is a member. Reich et al. (1996) confirm that considering "the cascading nature of design, participatory design cannot be a one-shot affair" (p. 170). Hence, effective participation requires continuous commitment in various contexts. It is also important to expand the information by including the perspectives of other inhabitants and users of the spaces. Exploring the future of (physical) learning spaces, which allow physical distancing and considerations is another recommendation of this study that might help prevent diseases or virus transmission (such as COVID-19), in addition to virtual spaces as potentials to create communities when physical spaces cannot be accessed.

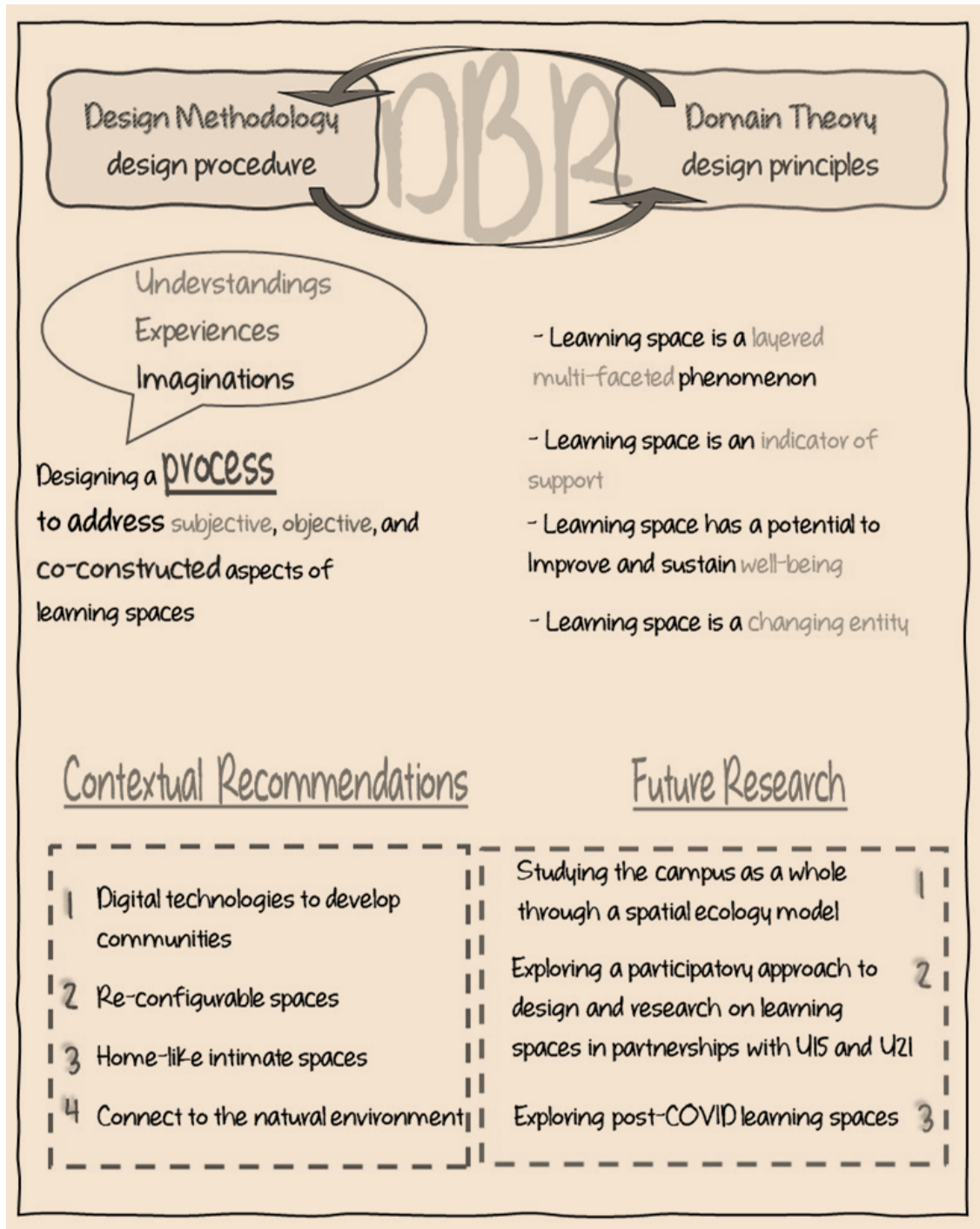


Figure 15. Contribution to learning space study and recommendations

The *design methodology* and *domain theory* developed in this study are the initial contributions to learning space research. To generalize, constant investigation and retrospective analysis should be conducted to identify appropriate generalizations. It is also important to expand the information by including the perspectives of other users of the spaces (undergraduate students, professors, staff, graduate program providers, etc.) in future work.

Findings from this study describe an approach and multiple design features that enable and support learners' autonomy. Boud (1981) suggested that autonomy enables learners find resources for

learning and choose when and where to learn. Students who were not provided with a space to work on campus were more likely to go home and study, which was not an ideal place for the less privileged students. They believed that providing quality space to graduate students to make it their “own space” is an indicator of support from the graduate programs and the supervisors. This is what Temple (2009) called message sending meaning that “campus designs give out signals about the importance of scholarship” (p. 210). Edwards (2014) argued that university buildings are silent teachers and that we may detect the exacting agendas of intellectual inquiry in the design of many university buildings. Building on a Lefebvrian understanding that space is a political phenomenon, Promsaka Na Sakonnakron and Burford (2020) explored the spatial practices of doctoral students, which, as they argued, shape their experience in higher education.

Participants of this study sought both physical and psychological comfort that implied their sense of well-being; they explained it has the potential to impact their productivity, creativity, and engagement. In her research, design, productivity and well-being, Heerwagen (1998) focused on four elements that must coexist to create positive and productive places: cognitive effectiveness, social support, emotional functioning, and physical function. She claims if people do not have a sense of well-being, they become distracted.

Participants emphasized the provision of choice since they need multiple spaces depending on the task they do or the stage of their doctoral program. As Parisio (2013) suggested, providing the learners with choice encourages freedom, flexibility, independence, mobility, and agility, which are integral to empowering autonomous learners. Addressing the dramatically changing global educational environments and practices, Keppell et al. (2011) called attention to reconfigurability as a “multistable” quality, which is an inhering aspect of any space. They claimed that “spaces must contain the potential and possibility of becoming their opposites, so that public spaces can be reconfigured to become private and active spaces can become didactic” (p. 27). As environment and mind mutually shape, the “multistable” learning space design, as they mentioned, allows mental space for learning.

FINAL NOTES

The notion of learning space for doctoral students is a maze of different spaces that is continually unfolding and changing based on different situations and needs, which make them grapple to navigate and negotiate with the provided opportunities. Learning spaces could then be portrayed in particular ways, seen as bounded by time, place, institutional and disciplinary culture. Deleuze and Guattari’s (1988) conception of smooth and striated space could be useful in influencing our thinking about what learning spaces might mean for changing doctoral education environments and practices. The notion of smooth space is open space, one of becoming, which is *nomadic*, in opposition to the striated which is space of closure, sedentary, or *bordered State* space.

Considering the radical changes that COVID-19 has brought in how we work, collaborate, study, and engage in social events, the timing is right for higher educational institutes to rethink their learning spaces for the post- COVID era in order to support students’ learning and their meaningful engagement in learning communities and learning spaces. They might start to explore the contribution of space to the creation of a sense of community and thus a place. I would adopt Evans et al.’s (2006) conception of learning *in, for, and through* a workspace for a learning space through which social processes can shape learners’ perceptions and attitudes toward engagement in learning, thus influencing their personal and professional development within the learning spaces and beyond. Providing potentials for learning spaces influences the nature of scholarly communities and the culture that exist within them. I also admit Temple’s (2009) argument that through such process any *space* can be transformed into a *place*, and this is the place that impacts academic experiences and outcomes.

Acknowledging Lefebvre’s (1991) argument that (social) space is a (social) product, learning space is a complex social construction based on values and the social production of meanings which affects spatial practices and perceptions of the learners. Space thus serves as a tool of thought and of

action; it can be seen also as a site of learning and more as a site of power. Before any decisions on learning space (re)design, we need to explore the complex interaction between space and campus community, during which both are changing. Through such exploration, we can provide opportunities where space becomes a place; Temple (2009) believed through this way, *physical capital* will be transformed into *social capital*.

REFERENCES

- Austin, A. E. (2009). Cognitive apprenticeship theory and its implications for doctoral education: A case example from a doctoral program in higher and adult education. *International Journal for Academic Development*, 14(3), 173-183. <https://doi.org/10.1080/13601440903106494>
- Avery, J. (1994). Strategic planning. In D. Warner and G. Kelly (Eds), *Managing educational property*. Buckingham: SRHE and Open University Press.
- Basdogan, M., & Morrone, A. S. (2021). Coffeehouse as classroom: Examining a flexible and active learning space from the pedagogy-space-technology-user perspective. *Journal of Learning Spaces*, 10(3).
- Beckers, R. (2019). Learning space design in higher education. In K. Fisher (Ed), *The translational design of universities* (pp. 149-175). Brill. https://doi.org/10.1163/9789004391598_010
- Bailin, K. (2011). Changes in academic library space: A case study at the University of New South Wales. *Australian Academic and Research Libraries*, 42(4), 342-359. <https://doi.org/10.1080/00048623.2011.10722245>
- Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, 13(1), 1-14. https://doi.org/10.1207/s15327809jls1301_1
- Beard, C., & Bawden, D. (2012). University libraries and the postgraduate student: Physical and virtual spaces. *New Library World*, 113(9/10), 439-447. <https://doi.org/10.1108/03074801211273911>
- Bhabha, H. K. (2012). *The location of culture*. Routledge.
- Binder, T., De Michelis, G., Ehn, P., Jacucci, G., Linde, P., & Wagner, I. (2011). *Design things*. MIT press. <https://doi.org/10.7551/mitpress/8262.001.0001>
- Bion, W. R. (1984). *Elements of psycho-analysis*. Karnac.
- Blomberg, J., & Kensing, F. (1998). Participatory design: Issues and concerns. *Computer Supported Cooperative Work (CSCW)*, 7(3-4), 167-185. <https://doi.org/10.1023/a:1008689307411>
- Boddington, A., & Boys, J. (2011). Reshaping learning – An introduction. In A. Boddington & J. Boys (Eds), *Re-Shaping Learning: A Critical Reader*. (pp. xi-xxii). Sense Publishers. <https://doi.org/10.1007/978-94-6091-609-0>
- Bond, E., & Goodchild, T. (2012). Challenges of teaching with technology in HE: Towards a new third space? In R. G. Carpenter (Ed.), *Cases on higher education spaces: Innovation, collaboration, and technology* (pp. 121-139). IGI Global. <https://doi.org/10.4018/978-1-4666-2673-7.ch007>
- Booth, M., Schofield, S., & Tiffen, B. (2012). Change and our future at UTS library: It's not just about technology. *Australian Academic and Research Libraries*, 43(1), 32-45. <https://doi.org/10.1080/00048623.2012.10722252>
- Boud, D. (1981). *Developing student autonomy in learning*. Nichols Publishing Company.
- Boyatzis, R.E. (1998). *Transforming qualitative information: Thematic Analysis and code development*. Sage.
- Boys, J. (2011). *Towards creative learning spaces: Re-thinking the architecture of post-compulsory education*. Routledge.
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101. <https://doi.org/10.1191/1478088706qp0630a>
- Brown, T. (2005). Beyond constructivism: Exploring future learning paradigms. *Education Today*, 2.
- Bryant, J., Matthews, G., & Walton, G. (2009). Academic libraries and social and learning space: A case study of Loughborough University Library, UK. *Journal of Librarianship and Information Science*, 41(1), 7-18. <https://doi.org/10.1177/0961000608099895>

- Capous-Desyllas, M., & Bromfield, N. F. (2018). Using an arts-informed eclectic approach to Photovoice data analysis. *International Journal of Qualitative Methods*, 17(1). <https://doi.org/10.1177/1609406917752189>
- Carpenter, C. (2011). Transforming the Georgia Tech Architecture Library into a social space. *Art Documentation*, 30(1), 79–83. <https://doi.org/10.1086/adx.30.1.27949571>
- Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *The Qualitative Report*, 21(5), 811–831. <https://doi.org/10.46743/2160-3715/2016.2337>
- Cha, S. H., & Kim, T. W. (2015). What matters for students' use of physical library space? *The Journal of Academic Librarianship*, 41(1), 274–279. <https://doi.org/10.1016/j.acalib.2015.03.014>
- Chan, D. L. H., & Spodick, E. (2014). Space development: A case study of HKUST library. *New Library World*, 115(5/6), 250–262. <https://doi.org/10.1108/nlw-04-2014-0042>
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage Publications.
- Chism, N. V. N. (2006). Challenging traditional assumptions and rethinking learning spaces. In D. G. Oblinger (Ed.), *Learning Spaces*, 2.1–2.12. Educause. <https://www.educause.edu/research-and-publications/books/learning-spaces>
- Cormier, D. (2008). Rhizomatic education: Community as curriculum. *Innovate: Journal of Online Education*, 4(5), 2. <https://nsuworks.nova.edu/innovate/vol4/iss5/2>
- Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.
- Cunningham, M., & Walton, G. (2016). Informal learning spaces (ILS) in university libraries and their campuses: A Loughborough University case study. *New Library World*, 117(1/2), 49–62. <https://doi.org/10.1108/nlw-04-2015-0031>
- Dallis, D. (2016). Scholars and learners: A case study of new library spaces at Indiana University. *New Library World*, 117(1/2), 35–48. <https://doi.org/10.1108/nlw-04-2015-0023>
- Deleuze, G., & Guattari, F. (1988). *A thousand plateaus: Capitalism and schizophrenia*. Continuum.
- Edelson, D. C. (2002). Design research: What we learn when we engage in design. *Journal of the Learning Sciences*, 11(1), 105–121. https://doi.org/10.1207/s15327809jls1101_4
- Edwards, B. (2014). *University architecture*. Taylor & Francis. <https://doi.org/10.4324/9781315025056>
- Elkington, S. (2019). Future learning spaces in higher education. In S. Elkington & B. Bligh (Eds.), *Future learning spaces: Space, technology and pedagogy* (pp. 3–5). Advance HE.
- Ellis, R. A., & Goodyear, P. (2016). Models of learning space: Integrating research on space, place and learning in higher education. *Review of Education*, 4(2), 149–191. <https://doi.org/10.1002/rev.3.3056>
- Evans, K., Hodgkinson, P., Rainbird, H., & Unwin, L. (2006). *Improving workplace learning*. Routledge. <https://doi.org/10.4324/9780203946947>
- Gardiner, M. (2002). Introduction. In M. Gardiner, *Critiques of everyday life*. Routledge. <https://doi.org/10.4324/9780203130858>
- Gardner, S. (2007). “I heard it through the grapevine”: Doctoral student socialization in chemistry and history. *Higher Education*, 54 (5), 723–740. <https://doi.org/10.1007/s10734-006-9020-x>
- Geertz, C. (1973). Thick description: Toward an interpretive theory of culture. In N. K. Denzin & Y. S. Lincoln (Eds.), *Turning points in qualitative research: Tying knots in a handkerchief* (pp. 143–168). AltaMira Press.
- Gierdowski, D. (2013). Studying learning spaces: A review of selected empirical studies. In R. G. Carpenter (Ed.), *Cases on higher education spaces: Innovation, collaboration, and technology* (pp. 14–39). IGI Global. <https://doi.org/10.4018/978-1-4666-2673-7.ch002>
- Golde, C. M. (2000). Should I stay or should I go? Student descriptions of the doctoral attrition process. *Review of Higher Education*, 23(2), 199–227. <https://doi.org/10.1353/rhe.2000.0004>

- Goodhart, F. W., Hsu, J., Baek, J. H., Coleman, A. L., Maresca, F. M., & Miller, M. B. (2006). A view through a different lens: Photovoice as a tool for student advocacy. *Journal of American College Health*, 55(1), 53-56. <https://doi.org/10.3200/jach.55.1.53-56>
- Harrop, D., & Turpin, B. (2013). A study exploring learners' informal learning space behaviors, attitudes, and preferences. *New Review of Academic Librarianship*, 19, 58-77. <https://doi.org/10.1080/13614533.2013.740961>
- Harvey, D. (1989). *The condition of postmodernity: An enquiry into the conditions of cultural change*. Wiley-Blackwell.
- Heerwagen, J. H. (1998). Design, productivity, and well-being: What are the links. In *ALA Conference on Highly Effective Facilities*, Cincinnati, Ohio, March, 12-14.
- Higher Education Funding Council for England. (2000). Strategic planning in higher education: A guide for heads of institutions, senior managers, and members of governing bodies (00/24). *Bristol: Higher Education Funding Council for England*.
- Holder, S., & Lange, J. (2014). Looking and listening: A mixed-methods study of space use and user satisfaction. *Evidence-Based Library and Information Practice*, 9(3), 4-27. <https://doi.org/10.18438/b8303t>
- Horwitz, J. R. (2012). Photovoice as a critical reflection methodology. In R., Flessner, G. R. Miller, K. M. Patrizio, & J. R. Horwitz (Eds.), *Agency through teacher education: Reflection, community, and learning* (pp. 15-24). Rowman & Littlefield.
- Hunt, L., Huijser, H., & Sankey, M. (2012). Learning spaces for the digital age: Blending space with pedagogy. In M. Keppell, K. Souter, & M. Riddle (Eds.), *Physical and virtual learning spaces in higher education: Concepts for the modern learning environment* (pp. 182-197). IGI Global. <https://doi.org/10.4018/978-1-60960-114-0.ch012>
- Ingram, B., Jesse, M., Fleagle, S., Florman, J., & Van Horne, S. (2013). Transform, interact, learn, engage (TILE): Creating learning spaces that transform undergraduate education. In R. G. Carpenter (Ed.), *Cases on higher education spaces: Innovation, collaboration, and technology* (pp. 165-185). IGI Global. <https://doi.org/10.4018/978-1-4666-2673-7.ch009>
- Jameson, F. (1992). *Postmodernism, or the cultural logic of late capitalism*. Duke University Press. <https://doi.org/10.1215/9780822378419>
- Jansen, H. (2010). The logic of qualitative survey research and its position in the field of social research methods. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 11(2). <https://doi.org/10.17169/fqs-11.2.1450>
- Jewitt, C. (2013). Multimodal methods for researching digital technologies. In Price, S. & Jewitt, C. (Eds.). *The SAGE handbook of digital technology research* (pp 250-265). SAGE Publications Ltd. <https://doi.org/10.4135/9781446282229.n18>
- Johns, N., & Lee-Ross, D. (1998) *Research methods in service industry management*. Cassell.
- Keppell, M., Souter, K., & Riddle, M. (2011). *Physical and virtual learning spaces in higher education: Concepts for the modern learning environment*. IGI Global. <https://doi.org/10.4018/978-1-60960-114-0>
- Kim, K. M. (2018). Academic socialization of doctoral students through feedback networks: A qualitative understanding of the graduate feedback landscape. *Teaching in Higher Education*, 23(8), 963-980. <https://doi.org/10.1080/13562517.2018.1449741>
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Lešer, V. J., Širca, N. T., Dermol, V., & Trunk, A. (2018). Career opportunities for PhD graduates in the knowledge-based economy: Case of Slovenia. *Procedia-Social and Behavioral Sciences*, 238, 104-113. <https://doi.org/10.1016/j.sbspro.2018.03.013>
- Lefebvre, H. (1991). *The production of space* (Vol. 142). Blackwell.
- Long, P. D., & Ehrmann, S. C. (2005). The future of the learning space: Breaking out of the box. *EDUCAUSE review*, 40(4), 42-58.
- Lux, V., Snyder, R. J., & Boff, C. (2016). Why users come to the library: A case study of library and non-library units. *The Journal of Academic Librarianship*, 42(2), 109-117. <https://doi.org/10.1016/j.acalib.2016.01.004>

- Malinverni, L., Schaper, M. M., & Pares, N. (2019). Multimodal methodological approach for participatory design of full-body interaction learning environments. *Qualitative Research*, 19(1), 71-89. <https://doi.org/10.1177/1468794118773299>
- Massis, B. E. (2012). In the library: Quiet space endures. *New Library World*, 113(7/8), 396–399. <https://doi.org/10.1108/03074801211245084>
- May, F., & Swabey, A. (2015). Using and experiencing the academic library: A multisite observational study of space and place. *College and Research Libraries*, 76(6), 771–795. <https://doi.org/10.5860/crl.76.6.771>
- McAlpine, L., & Norton, J. (2006). Reframing our approach to doctoral programs: An integrative framework for action and research. *Higher Education Research & Development*, 25(1), 3-17. <https://doi.org/10.1080/07294360500453012>
- Mei, B., & May, L. (2018). Reflective renovation: Insights from a collaborative and active learning space project evaluation. *Australasian Journal of Educational Technology*, 34(6). <https://doi.org/10.14742/ajet.4476>
- Muller, M. J. (1991). PICTIVE – An exploration in participatory design. *CHI Proceedings of the SIGCHI conference on Human factors computing systems: Research through technology*. <https://doi.org/10.1145/108844.108896>
- Muller, M. J. (2009). Participatory design: The third space in HCI. In A. Sears & J. A. Jacko (Eds.), *Human-computer interaction: Development process* (pp.165-185). Taylor & Francis Group. <https://www.taylorfrancis.com/chapters/edit/10.1201/9781420088892-15/participatory-design-third-space-hci-michael-muller>
- Nerad, M. (2012). Conceptual approaches to doctoral education: A community of practice. *Alternation*, 19(2), 57-72.
- Paretta, L., & Catalno, A. (2013). What students really do in the library: An observational study. *The Reference Librarian*, 54, 157–167. <https://doi.org/10.1080/02763877.2013.755033>
- Parisio, M. M. (2013). Designing learning spaces in higher education for autonomy: Preliminary findings and applications. *Electric Dreams. Proceedings of the ascilite conference*, Sydney.
- Plomp, T. (2007). Educational design research: An introduction. In T. Plomp & Nieveen (Eds.), *An introduction to educational design research* (pp. 9-36).
- Promsaka Na Sakonnakron, S., & Burford, J. (2020). Doctoral students’ readings of the politics of university office space. *New Zealand Journal of Educational Studies*, 55(1), 165-180. <https://doi.org/10.1007/s40841-019-00149-w>
- Radcliffe, D., Wilson, H., Powell, D., & Tibbetts, B. (2009). Learning spaces in higher education: Positive outcomes by design. In *Proceedings of the Next Generation Learning Spaces 2008 Colloquium*, University of Queensland, Brisbane.
- Reeves, T. C. (2006). Design research from a technology perspective. In J. V. d. Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 52-66). Routledge. <https://doi.org/10.4324/9780203088364>
- Reich, Y., Konda, S. L., Monarch, I. A., Levy, S. N., & Subrahmanian, E. (1996). Varieties and issues of participation and design. *Design Studies*, 17(2), 165-180. [https://doi.org/10.1016/0142-694x\(95\)00000-h](https://doi.org/10.1016/0142-694x(95)00000-h)
- Riddle, M. D., & Souter, K. (2012). Designing informal learning spaces using student perspectives. *Journal of Learning Spaces*, 1(2). <https://doi.org/10.3390/buildings11060252>
- Rigler, K. L., Jr., Anastasia, C. M., El-Amin, A., & Throne, R. (2021). Scholarly voice and academic identity: A systematic review of doctoral student agency. In S. Zimmerman (Ed.), *Handbook of research on developing students’ scholarly dispositions in higher education* (pp. 63-89). IGI Global. <https://doi.org/10.4018/978-1-7998-7267-2.ch004>
- Robertson, T., & Simonsen, J. (2012). Participatory design: An introduction. In J. Simonsen & T. Robertson (Eds.), *Routledge international handbook of participatory design*. Taylor & Francis Group. <https://www.taylorfrancis.com/chapters/edit/10.4324/9780203108543-1/participatory-design-toni-robertson-jesper-simonsen?context=ubx>
- Rodriguez, E. (2018). Google forms in library instruction: Creating an active learning space and communicating with students. *Scholarship of Teaching and Learning, Innovative Pedagogy*, 1(1), 7.

- Roulston, K. (2001). Data analysis and 'theorizing as ideology'. *Qualitative Research*, 1(3), 279-302. <https://doi.org/10.1177/146879410100100302>
- Saldana, J. (2013). *The coding manual for qualitative researchers*. SAGE.
- Sanders, E.B.-N. (1993) Converging perspectives: Product development research for the 1990s. *Design Management Journal*, 3, 49–54. <https://doi.org/10.1111/j.1948-7169.1992.tb00604.x>
- Sanders, E. B.-N. (1999). Post design and participatory culture. *Proceedings of Useful and Critical: The Position of Research in Design*, Helsinki: University of Art and Design, 87–92.
- Sanders, E. B. N. (2013). Prototyping for the design spaces of the future. In L. Valentine (Ed.), *Prototype: Design and craft in the 21st century* (pp. 59-74) Bloomsbury. <https://doi.org/10.5040/9781350036031.ch-004>
- Sanders, E. B. N., Brandt, E., & Binder, T. (2010). A framework for organizing the tools and techniques of participatory design. In *Proceedings of the 11th biennial participatory design conference*, 195-198. <https://doi.org/10.1145/1900441.1900476>
- Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *Co-design*, 4(1), 5-18. <https://doi.org/10.1080/15710880701875068>
- Sandiford, P. J., & Ap, J. (2003). Important or not? A critical discussion of Likert Scales and Likert-type Scales as used in customer research. In *12th Annual CHME Hospitality Research Conference: Trend and developments in hospitality research*, Sheffield Hallam University, Sheffield, South Yorkshire, England.
- Savin-Baden, M. (2007). *Learning spaces: Creating opportunities for knowledge creation in academic life*. McGraw-Hill Education.
- Savin-Baden, M. (2019). Learning ecologies: Liminal states and student transformation. In R. Barnett., & N. Jackson (Eds.), *Ecologies for learning and practice* (pp. 46-60). Routledge. <https://doi.org/10.4324/9781351020268-4>
- Sawhney, M., Prandelli, E., & Verona, G. (2003) The power of innomediatio: Exploiting the power of mediated innovation. *MIT Sloan Management Review*, 44, 77–82.
- Scott-Webber, L. (2004). *In sync: Environmental behavior research and the design of learning spaces*. Society for College and University Planning.
- Sherringham, S., & Stewart, S. (2011). Fragile constructions. In A. Boddington & J. Boys (Eds.), *Re-shaping learning: A critical reader* (pp. 105-118). Sense Publishers. https://doi.org/10.1007/978-94-6091-609-0_8
- Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. *International Journal of Qualitative Methods*, 8(1), 76-84. <https://doi.org/10.1177/160940690900800107>
- Stewart, C. (2011). Building measurements: Assessing success of the library's changing physical space. *The Journal of Academic Librarianship*, 37(6), 539–541. <https://doi.org/10.1016/j.acalib.2011.09.002>
- Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511557842>
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Grounded theory procedures and techniques* (2nd ed.). Sage. <https://doi.org/10.4135/9781452230153>
- Swist, T., & Kuswara, A. (2016). Place-making in higher education: Co-creating engagement and knowledge practices in the networked age. *Higher Education Research & Development*, 35(1), 100-114. <https://doi.org/10.1080/07294360.2015.1128887>
- Temple, P. (2007). *Learning spaces for the 21st century: A review of the literature*. Centre for Higher Education Studies, Institute of Education, University of London
- Temple, P. (2008). Learning spaces in higher education: An under-researched topic. *London Review of Education*, 6(3), 229-241. <https://doi.org/10.1080/14748460802489363>
- Temple, P. (2009). From space to place: University performance and its built environment. *Higher Education Policy*, 22(2), 209-223. <https://doi.org/10.1057/hep.2008.30>

- Temple, P. (2014). Preface. In P. Temple, *The physical university: Contours of space and place in higher education*. Routledge.
- Thomas, C. L., Pavlechko, G. M., & Cassady, J. C. (2019). An examination of the mediating role of learning space design on the relation between instructor effectiveness and student engagement. *Learning Environments Research*, 22(1), 117-131. <https://doi.org/10.1007/s10984-018-9270-4>
- Tuan, Y. F. (1977). *Space and place: The perspective of experience*. U of Minnesota Press.
- U15. (2017). *Who We Are*. Group of Canadian Research Universities. <http://u15.ca/who-we-are>
- Van den Akker, J., Gravemeijer, K., McKenney, S. & Nieveen, N. (2006). *Educational design research*. Routledge. <https://doi.org/10.4324/9780203088364>
- Walker, G. E., Golde, C. M., Jones, L., Bueschel, A. C., & Hutchings, P. (2009). *The formation of scholars: Rethinking doctoral education for the twenty-first century* (Vol. 11). John Wiley & Sons.
- Wang, C. (1999). Photovoice: A participatory action research strategy applied to women's health. *Journal of Women's Health*, 8(2), 185-192. <https://doi.org/10.1089/jwh.1999.8.185>
- Wang, C., & Burris, M. A. (1997). Photovoice: Concept, methodology, and use for participatory needs assessment. *Health Education & Behavior*, 24(3), 369-387. <https://doi.org/10.1177/109019819702400309>
- Wang, F., & Hannafin, M. J. (2005). Design-based research and technology: Enhanced learning environments. *Educational Technology Research and Development*, 5 (4), 5-23. <https://doi.org/10.1007/bf02504682>
- Wickramasinghe, L. C., & Borger, J. G. (2020). The new age of the PhD: Transforming the PhD from a product to a process. *Journal of Life Sciences*, 2(1). <https://doi.org/10.36069/jols/20200303>
- Woolner, P., McCarter, S., Wall, K., & Higgins, S. (2012). Changed learning through changed space: When can a participatory approach to the learning environment challenge preconceptions and alter practice?. *Improving schools*, 15(1), 45-60. <https://doi.org/10.1177/1365480211434796>
- Worthington, J. (2006). *Reinventing the workplace*. Routledge. <https://doi.org/10.4324/9780080455518>
- Zeivots, S., & Schuck, S. (2018). Needs and expectations of a new learning space: Research students' perspectives. *Australasian Journal of Educational Technology*, 34(6). <https://doi.org/10.14742/ajet.4516>

APPENDIX: QUESTIONNAIRE

5. Stage of your doctoral program:

First year ☐ Second year ☐ Third year ☐ Fourth year ☐ More ☐

6. Program of study: _____

7. Faculty/Department: _____

8. Are you an international student: Yes ☐ No ☐

9. Does your supervisor provide you a specific work/research space during your PhD? Yes ☐ No ☐

- The following questions provide you with an opportunity to inform us about your understanding of learning spaces in relation to your doctoral studies. For a majority of the questions, you will be asked to indicate how much you agree/disagree with the presented statement.

	Strongly Disagree			Neutral			Strongly Agree
	1	2	3	4	5	6	7
10	Learning space is a formal setting of a classroom. Please briefly explain why? _____ _____ _____						
11	Learning space is the creation of specific individualized space and time for writing and/or reflection. Please briefly explain why? _____ _____ _____						

12	Learning space is using social learning environments for dialogue and conversation with peers. Please briefly explain why? _____ _____ _____						
13	Learning space is accessing digital environments for discussion and reflection with and/or through others. Please briefly explain why? _____ _____ _____						
14	Learning space is a less structured and a more flexible environment for exploration. Please briefly explain why? _____ _____ _____						
15	Learning space is physical or psychological removal from everyday experiences, for example: attending conferences, workshops. Please briefly explain why? _____ _____ _____						
16	Learning space is a new environment, which prompts new ways of seeing issues and challenges the current ways of thinking, for example: working with peers overseas in a different culture. Please briefly explain why? _____ _____ _____						
17	Learning space is a physical environment designed by architects and equipped with furniture. Please briefly explain why? _____ _____ _____						
18	Students can change the learning spaces within the existing spaces in order to meet their needs. Please briefly explain why? _____ _____						

19. Please add any other space that means a “space for learning” to you.

- The following series of questions give you an opportunity to tell us about your experiences with UBC Okanagan's spaces in relation to your studies.

		Strongly Disagree			Neutral			Strongly Agree
		1	2	3	4	5	6	7
20	Classrooms have been the most important learning spaces during my studies.							
21	Most of my learning takes place in the labs, which are typically assigned to a specific department or program.							
22	Campus library is a motivating learning space.							
23	I have found the Graduate Collegium a productive learning space.							
24	Bookable Student Study Spaces on campus (for example in EME building) have been useful as individualized spaces for writing and reflection.							
25	The graduate office provided by my supervisor/program has been an important space in my PhD program.							
26	I prefer doing my studies off campus in informal spaces such as coffee shops.							
27	I would rather work from home whenever it is possible.							
28	If I have access to a quality internet and online resources, I can be anywhere to do my work.							
29	Social spaces that foster conversations with scholarly communities have been important during my PhD experience.							
30	I have done [part of] my PhD in an interdisciplinary environment interacting with peers from different backgrounds and I have found it productive.							
31	Being a member of a wider scientific community on campus has helped me dealing with isolation in my PhD.							
32	Available physical spaces on campus have been sufficient and helpful to conduct my PhD.							

33. Please add any other statements and comments regarding the UBC Okanagan spaces in relation to your PhD experience.

● Using numbers (1,2,3,...) on the campus map below, prioritise the spaces that you have most used during your PhD. Please write the purpose for each.

● If you can change one thing in your existing learning spaces, what would it be?

● What is the ideal learning space for doctoral students at UBC Okanagan?

AUTHOR



Serveh Naghshbandi is a design researcher and educator currently working in Melbourne. She conducts design-based research to explore collective forms of creativity. Having a PhD and a Master's in Education, a Master's in Design, and obtaining several years of experience as a design educator and practitioner in several countries, she explores new spaces in the emerging design landscapes in research, learning, and teaching contexts.