Instructional Strategies and Learning Technologies to Support Student Learning

by

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Abstract

The use of learning technologies is prevalent in post-secondary education and can provide opportunities for learning in different ways (Bernardo & Duarte, 2020; Johnson et al., 2014). Integration of learning technologies requires an understanding of learning technologies within the context of "what it takes to learn" (Laurillard, 2009, p. 7) in a post-secondary environment.

In this study, a generic qualitative research approach was used to explore instructional strategies and learning technologies instructors used in their teaching. Purposeful sampling was used to select 12 instructors teaching at a university in Alberta. Recorded interviews obtained in-depth information about the experiences of instructors. I used a self-reflexive journal to document my opinions and as a way to review and refine my research. Laurillard's Conversational Framework (2009, 2013) was used as a theoretical framework. Data analysis identified themes pertinent to my research question and theoretical framework.

Instructors used a variety of instructional strategies and learning technologies to present concepts to students, design opportunities for students to clarify their understanding of course concepts, and create engaging practice tasks. Instructors integrated learning technologies into their teaching in ways that recognized the benefits of learning technologies and non-technological strategies.

A learning-centred framework was created to capture themes and included teacher and student conceptions, safe teaching and learning environments, learning technologies, and workload. I provided recommendations for university administrators, instructors, professional development leaders, and researchers and concluded with additional questions around policy and practice.

Preface

This thesis is an original work by Lynn G. Feist. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Study Title "Exploring Faculty Members' Use of Leaning Technologies to Support Learning", Study ID: Pro00062290, February 5, 2016.

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Background

Almost a century ago, John Dewey wrote about the philosophy of experience in education and the need for teachers to create environments promoting student engagement. Dewey explained that educative experience allows individuals to understand and then be able to deal effectively with future situations. Content knowledge on its own does not prepare an individual for future experience. An educative experience must be sufficiently engaging and foster growth so that an individual approaches future experience with "greater understanding, compassion, or action" (Dewey, 1938/1963, p. 25).

The Government of Alberta's (2021) *Alberta 2030: Building Skills for Jobs* report emphasized work integrated learning to provide "hands-on learning opportunities" to help "students gain practical skills" (p. 22). I find it puzzling that *Alberta 2030: Building Skills for Jobs* is described as a strategic step in "transforming our post-secondary system" (Government of Alberta, 2021, p. 4) when some of the underlying ideas are similar to what Dewey wrote about years ago. Although there are some similarities between Dewey's writings and the ideas within *Alberta 2030: Building Skills for Jobs* (Government of Alberta, 2021), there is a notable difference. The *Alberta 2030: Building Skills for Jobs* document suggests learning technologies are an important component of education. The COVID-19 pandemic has accelerated "the adoption of remote and online learning … challenging traditional ways of providing post-secondary education" (Government of Alberta, 2021, p. 6).

Laurillard (2013) explained, although academic learning should be situated in the real world, it is sometimes difficult to be situated in an abstract concept. When concepts, such as molecules changing during a chemical reaction, cannot be experienced directly, academic learning is different from experiential learning. Learning that is not directly experienced is *mediated* by teachers who use analogies, articulations, interpretations, and symbolic representations. Learning technologies provide opportunities for presenting information in different ways, collaboration, real-world activities, thinking in creative ways, and critical thinking. Instead of consuming knowledge, students are able to create content through the use of tools like video, podcasts, discussions, and video conferencing (Bernardo & Duarte, 2020; Moluayonge, 2020). As Dewey (1938/1963) wrote, an emphasis on content transmission will not necessarily engage students and should not be presumed to prepare them for future learning, for employment, or to be ethical citizens.

Research Interest and Researcher Experiences

I first began supporting online education in the late 1990s and I worked with instructors to convert their classroom lectures, activities, and assignments to an online format. Despite having more robust and diverse learning technologies available, some instructors continue to convert classroom lectures, activities, and assessments to an online format. Although there are opportunities to expand understandings of teaching and learning, perhaps using social learning tools or drawing upon ideas of constructivism or constructionism (Papert, 1991), it seems some instructors digitize what they have done in the face-to-face classroom. While I have been able to see ways some instructors have used learning technologies to support student learning, I recognize that simply using technologies

does not automatically create innovative, engaging, real-world learning experiences preparing students for future experiences.

I have grappled with understanding how different theories of learning fit into formal post-secondary environments, especially when courses have diverse learning outcomes and diverse students. I do not necessarily believe any one learning theory is inherently better than another; rather, I believe it depends on the learning situation. I have wondered how and why instructors use learning technologies to support student learning.

I am involved with supporting a learning management system (LMS) at a small university in Alberta, and providing this support has highlighted two things for me. First, the LMS is no longer a small, stand-alone application being used by a few instructors interested in technology. It has become the most used application at my university and requires integration with our other systems to ensure students and instructors have access to the correct courses without interruptions. Second, instructors require support to learn about the tools and features of the LMS as well as the integration with other systems, policy, and academic processes related to the LMS.

How I know what I know

I come to learning technologies as a student, a parent, and an educator. These varied experiences have shaped *how* I have come to know online education and technology as well as *what* I know about online education and technology.

I chose to take an online course as a doctoral student because of the course topic and the flexibility of the delivery format. There were readings, mini-lectures from the professor through an online conferencing system, discussions with classmates, group presentations, an individual presentation, and a research paper. Navigation of the course was simple and easy

to follow. I was able to progress through each week, which was labeled clearly on the course home page, and follow links to readings, websites, or online discussions. Group presentations through an online conferencing system and weekly discussions in the LMS allowed me to get to know classmates within my group and we continued to share information by email for months after the course was over.

I also took a face-to-face course in my doctoral program that used a blended learning format. We met in person every two or three weeks. During the weeks that we did not meet in person, we completed writing assignments, which we posted in the LMS. We were invited to read and comment on our classmates' postings. The professor used a portion of each face-to-face class to review our writing, provide feedback, and clarify common misconceptions. Although it was initially unsettling to see my work, with corrections, projected for all to see, the professor created a climate of trust, respect, and deep thought. Learning about the topic and learning to rely on peer reviews did transform my learning, both in the class and for my doctorate.

My two sons chose an online school for junior and senior high school. As a family, we examined the benefits and drawbacks of remaining in a traditional school or moving to an online school. Perhaps the greatest factor influencing our decision was that my sons, and probably my husband and I, did not fit within the structure of a traditional school system. We questioned rules, ways of learning, our perceptions of equity, and definitions of success. As a parent, I was thankful for the opportunities my children had in attending an online school. They learned how to learn and to be responsible for their own learning. We learned how to navigate the school system as a family and, as a family, we could support each other as needed. We could structure school to fit around life instead of our lives having to fit around

the structure of school. As my sons moved into high school, there came opportunities for them to go to the school to meet other students and ask questions of the teachers in person. The teachers in the school were instrumental in our family having a positive learning and schooling experience. They treated my children as individuals, recognizing their strengths and how they could contribute to and be members of a larger community. My children were not bound by age and space constraints of the traditional classroom and developed friendships with people of varying ages both in and out of school settings. The personal experiences I had as a parent shape how I approach learning technologies, both in my work and as a graduate student. It adds an element of passion and commitment to what I do.

I have been working in the area of post-secondary online education since 1998. I spend most of my time supporting department chairs, instructors, staff, and students with issues around online education and related technologies. I think of myself as a translator or navigator, acting as a communication facilitator at the intersection of information technology and academics. Having the opportunity to move from supporting online course development and delivery within one faculty to supporting eLearning at my university has allowed me to think about what support of learning technology means from an institutional level. It has also allowed me to participate in governance committees and work more closely with instructors and staff from across the university. It is from this support role that I approached my doctoral research.

Significance of the Study

Some literature seems to evaluate the use of learning technologies in isolation from the whole learning experience instructors create for students, perhaps not fully acknowledging the complexities of teaching and learning in an academic environment (e.g.,

Castillo-Manzano et al., 2016; Hamad, 2017). Using Laurillard's Conversational Framework (2009, 2013), this study explored the ways instructors integrated learning technologies into their instructional strategies in order to create learning opportunities for students. This study contributes to theory by building upon Laurillard's research and the learning theories she has incorporated into the Conversational Framework.

Laurillard (2009, 2013) described what it takes to learn in a formal academic environment, or, what instructional strategies are needed to create a learning-centred environment. Some literature suggests that the term learning-centred refers to the process of learning while the term learner-centred refers to individual students (Blumberg, 2009). However, the terms are used inconsistently in the literature. During this study I further explored the differences between learner and learning-centred strategies to aid in clarification between the two terms.

This study and findings contribute to professional practice related to teaching and learning in formal post-secondary environments. University leaders, staff who support instructor professional development, and instructors will benefit from the results of this study. University leaders will see how instructors' perceptions can be affected by policies or procedures. A framework to consider what is required for formal learning could be used by staff supporting instructor professional development. Ways to think about the integration of instructional strategies and learning technologies will improve instructor practice.

Purpose of the Study

The purpose of my research study was to explore the instructional strategies and learning technologies instructors used to support student learning in post-secondary institutions. Laurillard's Conversational Framework (2009, 2013) was used as a theoretical

framework. Stated in the form of a question, the research was guided by the following: *What instructional strategies and learning technologies do instructors use to support student learning?* Emerging from this main research question are five sub-questions which guided and focused the study:

1. What explanatory and presentational strategies do instructors use to help students achieve understandings of course concepts?
2. How do instructors check students' understandings of course concepts?
3. How do students engage in practice tasks to develop understandings of course concepts?
4. What opportunities are provided for students to discuss concepts or collaborate with classmates?
5. How are learning technologies integrated to achieve teaching and learning goals?

Although there may be changing technologies, Laurillard (2009) emphasized what is required to learn in a formal post-secondary environment does not change. Laurillard's Conversational Framework was chosen as a theoretical framework for this study because it described what is required by instructors to make learning possible. My interest was in how instructors used instructional strategies and learning technologies to support their teaching and thus student learning. I did not explore students' experiences of learning.

Definitions

I make use of terms that are defined as follows:

1. Instructional strategies are the teaching-learning activities chosen by teachers to motivate and guide student learning (Laurillard, 2012).

2. Learning technologies refer to computer-based tools used to create learning opportunities for students.
3. Concepts are topics, ideas, theories, events, situations, abstract representations, and values within a particular academic discipline (Ausubel, 2000; Laurillard, 2013).
4. Active learning activities are activities students engage in during a class to help them understand course concepts.

Limitations

This study was limited to twelve instructors, at one post-secondary institution within Alberta, who integrated learning technologies into their teaching and learning before COVID-19. Ease of access, as I am an *insider,* led me to select the institutional research site. Furthermore, willingness to participate affected the selection of participants. Participants volunteered because of interests in teaching and learning, learning technologies, and participating in a research study. They may have read literature or heard presentations about teaching and learning and using learning technologies and their responses may reflect the ideas, opinions, or experiences of others. Truth or knowledge was constructed by participants and me, as researcher, within the context of this study. The findings of this study may not be the same as findings constructed at a different time or place or with different participants, but it does provide insight to the understandings of the participants as these relate to the research sub-questions and central question.

Delimitations

The study investigated the ways instructors used learning technologies to support teaching and learning. Interview conversations did not investigate details of how participants' understanding of educational research could inform such use. Experiences of students,

support staff, and administrators could provide different perspectives on teaching and learning with technology in a particular class; however, this study was delimited to instructors' experiences.

Organization of the Thesis

This thesis is organized and presented in eight chapters. Chapter two reviews relevant literature and is organized around key topics: (a) Laurillard's Conversational Framework, (b) philosophies of teaching and learning, (c) approaches to learning, (d) instructional strategies, (e) learning-centred versus learner-centred perspectives. (f) learning technologies, (g) learning management systems, and (h) learning technologies and COVID-19. Chapter three includes a rationale for the methodology and the role of the researcher, participant selection, ethical considerations, and constraints. Data collection, analysis, and trustworthiness are also addressed. Chapters four to six present the findings related to instructional strategies and learning technologies used by the 12 instructor participants in this study. Findings are organized around Laurillard's (2009, 2013) Conversational Framework. Chapter seven presents a synthesis of the findings and the literature. An overview of the study, conclusions, recommendations, and final reflections are presented in chapter eight.

Chapter Two: Literature Review

In my study, I set out to examine instructional strategies and learning technologies used by instructors to support student learning. This review of the literature explores and connects the broad topics of Laurillard's Conversational Framework, philosophies of teaching and learning, approaches to learning, instructional strategies, learning-centred versus learner-centred perspectives, learning technologies, learning management systems, and learning technologies and COVID-19. These topics provide an overview of current knowledge within the field and help to identify the complex interplay of the concepts considered and examined in relation to my study's research question. A summary and the relationship to my study's research question will be included after learning-centred perspectives and after learning technologies and COVID-19.

Laurillard's Conversational Framework

In her book *Rethinking university teaching: A conversational framework for the effective use of learning technologies (2nd ed.)*, Laurillard (2013) described the challenges students experience when learning in a formal academic environment. Academic knowledge consists of theories, concepts, and descriptions that are represented through "language, symbols, diagrams, [and] pictures" (Laurillard, 2013, p. 53). It is therefore difficult for students to experience academic knowledge. As an example, Laurillard explained learning about dogs could occur through direct experience with an actual dog. Learning about molecules occurs through some kind of representation. Even when it appears that students may directly experience the world, such as looking at specimens through a microscope, the teacher often contextualizes or mediates academic experiences. Students may work with

analogies, historical accounts, or case studies. “Academic knowledge does not present itself through experience with the world” (Laurillard, 2013, p. 45).

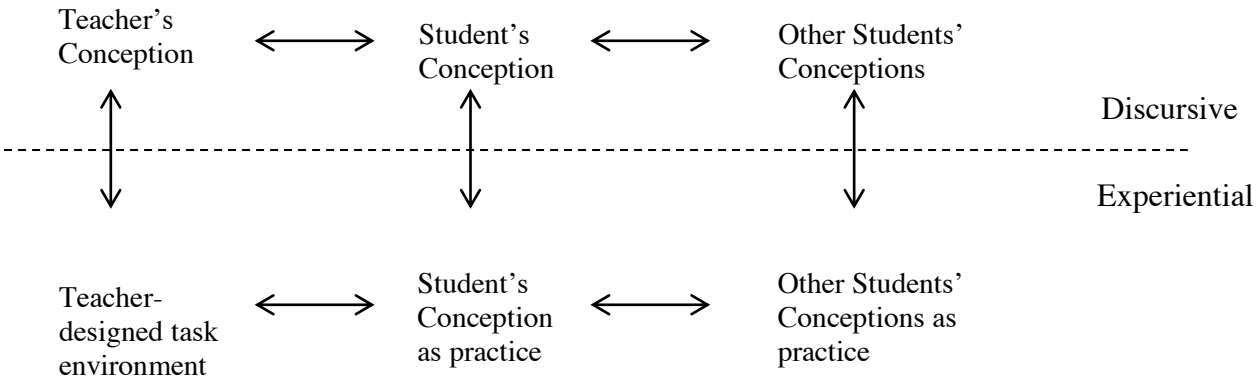
According to Laurillard (2013), phenomenography can help teachers understand the ways in which students grapple with the meanings of theories, concepts, and representations and thus can inform an approach to teaching. Phenomenography is concerned with “the variation in students’ conceptions … to help learners change from one conception to another” (Laurillard, 2013, p. 69). A phenomenographical conversation between the teacher and student allows the teacher to question understandings and clarify misconceptions in ways that give meaningful feedback to the student that, in turn, allows the student to provide a revised representation of the topic and achieve the desired learning outcome.

Although, Laurillard (2013) indicated her belief that phenomenography provided a way of generating a teaching strategy, she acknowledged that such a one-on-one conversation or tutorial is not feasible in a university setting. The Conversational Framework is a distillation of existing learning theories meant to result in effective learning in formal learning environments. It “defines the core structure of an academic dialogue” (Laurillard, 2013, p. 88) and acts as a way to “bridge between what we know about student learning and what we should therefore do as teachers” (Laurillard, 2013, p. 62). The framework is not an explanatory theory, rather “it is a framework for thinking about the design of learning and teaching, which integrates several theories of learning, and whose representation is based on Pask’s [1976] analysis of learning as a form of conversation” (Laurillard, 2009, p. 12). Laurillard (2020) clarified the framework is not solely a series of conversations, but is rather a series of iterations between the learner and teacher, and between the learner and peers, which occur at the discursive and experiential levels. Laurillard stressed the “Conversational

Framework can be used to support the decision-making process" (Laurillard, 2009, p. 13) as teachers design learning and can also be used to test whether the design of existing learning is "sufficiently rich to support effective learning" (Laurillard, 2009, p. 16). Laurillard's Conversational Framework is illustrated in Figure 1.

Figure 1

Laurillard's Conversational Framework



Adapted from Laurillard, D. (2009). The pedagogical challenges to collaborative technologies. *Computer-Supported Collaborative Learning, 4(*1), 5-20.

Teacher's conception includes explaining concepts to students, motivating students to ask questions or articulate their conceptions, and answering students questions or commenting on students articulations (Laurillard, 2013). Teacher's conception also includes ideas, beliefs, and conceptions of teaching and learning. Pratt (1992) described teaching perspectives or conceptions as one's understanding of what it means to teach, to learn, and to know. Conceptions of teaching are created through an interaction of actions, intentions, and beliefs (Pratt, 1992; Pratt et al., 2001) and are elaborated upon in a later section of this chapter. Student's conception is the learning acquired as well as the student's approach to learning. Student approaches to learning is included in a later section of this chapter.

Laurillard's Conversational Framework contains two levels, the discursive and the experiential. The discursive or conceptual level includes "articulating and discussing theory, ideas, concepts, and forms of representation" (Laurillard, 2009, p. 8). Scott (2001) described this as "knowing why" (p. 348). Why knowledge is cognitive and conceptual. Through verbal exchange, the teacher provides explanations, provides feedback, and clarifies misconceptions. The student receives and then offers back explanations and receives feedback. New knowledge of a topic is integrated with existing, conceptual knowledge of other topics. Discussion and debate with other students also helps to develop conceptual knowledge (Laurillard, 2020).

The experiential or practice level is "knowing how" (Scott, 2001, p. 349). How knowledge addresses procedure, performance, or application. Demonstrations, modeling, and problem solving, often with verbal commentary, facilitate learning. When the task is complex, students collaborate to complete the task and negotiate concepts (Laurillard, 2020).

Why and how learning are "complementary aspects of effective learning" (Scott, 2001, p. 353). The two levels are connected through processes of reflection and adaptation by the teacher and students. The two levels are both essential to ensure iterative interaction and learning. There is "inseparability of knowledge and action, and of process and outcome … each part is constituted in its relation to the other parts" (Laurillard, 2013, p. 42).

Laurillard's (2009, 2013) Conversational Framework integrates learning theories to provide a conceptualization of what it takes to teach and learn in a formal academic setting. Laurillard differentiated academic learning from every-day learning, which involves more first-hand experience. Central to the Conversational Framework are iterations between the teacher and student, and among students at the discursive and experiential levels. Teachers

and students reflect on and adapt their conceptions during the teaching and learning process. To more fully understand Laurillard's Conversational Framework, examination of philosophies of teaching and learning, instructional strategies, and approaches to teaching and learning are required.

Philosophies of Teaching and Learning

Educational and psychological theories provide ways to understand formal academic learning and Laurillard's Conversational Framework. Laurillard (2012) explained bringing together different approaches provides a "more robust understanding of what it takes to learn in education" (p. 45). Although other methodologies have been used to categorize learning theories (e.g., Elias & Merriam, 2005), a synthesis of the theories Laurillard believed contribute to an understanding of formal learning are presented below as a way to further understand the Conversational Framework.

Behaviourism

A behaviourist approach presumes learning can be shaped by using rewards and punishments. Instruction begins with behavioural objectives and focuses on the content, not the process of learning. Teachers assess learning by observing certain behaviours that are measured against the objectives (Ausubel, 2000; Conrad & Openo, 2018; Laurillard, 2012). Although Laurillard (2012) wrote that behaviourism may be of limited use in formal learning, she recognized the use of marks, grades, and credentials as rewards to motivate students.

Associate Learning

Laurillard (2012) wrote about the importance of Associate Learning because of the focus on the process of learning. Trial-and-error learning is the basis of neural network

models and has relevance to basic skills such as reading and arithmetic. Ideas and experiences reinforce each other and are linked together. Associate models of learning could help educators better understand how students learn and how to help students who may have learning disabilities such as dyslexia or dyscalculia. Assisting learners to develop compensatory strategies should be included in university-level teaching (Laurillard, 2012).

Cognitive Learning

Cognitive approaches to learning reject the idea that trial and error would be a sufficient mechanism for learning. Learning is about mental ability and development. Gestalt psychologists emphasized a structural approach to learning for students to be able to consciously "make sense of the relationship between the goal, their action and its result" (Lauillard, 2012, p. 47). Cognitive learning is about "thinking, concept formation, problem solving, and the learning of connected discourse" (Ausubel, 2000, p. 38). Although some authors included Ausubel's work in explanations of cognitive learning (e.g., Conrad & Openo, 2018), Laurillard included Ausubel's work under conceptual learning.

Experiential Learning

In his book *Experience and Education* (1938/1963), Dewey noted the main purpose of school, at the time of his writing, seemed to be the transmission of knowledge or content. Furthermore, he questioned whether the teaching of static knowledge was the concept upon which teaching should be based. He proposed "the new philosophy of education is committed to some kind of empirical and experimental philosophy" (Dewey, 1938/1965, p. 25), further connecting education and personal experience. The role of the teacher is to "arrange for the kind of experiences which, while they do not repel the student, but rather engage his [sic] activities, are nevertheless, more than immediately enjoyable since they promote having

desirable future experiences … every experience lives on in further experiences" (Dewey, 1938/1965, p. 27).

Dewey explained educative experiences work together to "foster greater understanding, compassion, or action" (Dewey, 1938/1965, p. 25). When we create separate, distinct learning experiences, there may not be a connection to future experiences. The need to have a learning experience connect to future learning experiences is the first principle of educative experience – that of continuity. According to Dewey, an experiential continuum exists in which educative experiences lead to and inform future experiences.

The second principle of educative experience is interaction. "We live in a world of persons and things … [that exist from] previous human activities" (Dewey, 1938/1963, p. 39). Interaction refers to the idea that experience does not occur simply within an individual's body or head. Although not all educative experiences involve interacting with another person, there is always a "transaction" (Dewey, 1938/1963, p. 43) between an individual and the environment.

Social Constructivism

Constructivism is "a collection of perspectives all of which share the common assumption that learning is how people make sense of their experience – learning is the construction of meaning from experience" (Merriam & Bierema, 2013, p. 36). Learning occurs as students actively engage in experiential learning, reflect on practice or application, and gain new perspectives or constructions of knowledge. Learning is contextual, social, and authentic. Constructivist environments are student-centred. Students take control of, or are involved with, their learning. Students are active learners and construct knowledge through

"meaningful, open-ended, challenging problems" that allow them to make sense of their world (Fox, 2001, p. 24).

In order to clarify epistemological positions underlying constructivist learning theories, Kanuka and Anderson (1999) positioned major forms of constructivism along two dimensions. The first dimension defined each constructivist perspective along a continuum between understanding reality as either objective or subjective. The second dimension defined each constructivist perspective position as understanding knowledge as socially constructed or individually constructed. The authors described cognitive constructivism, radical constructivism, co-constructivism, and situated constructivism, with co-constructivism or social constructivism being the most prevalent form of constructivist epidemiology.

According to Laurillard (2012), complex learning requires the use of language and social interaction. Aligning with Vygotsky (1962), knowledge is constructed through a socio-linguistic process within social and cultural contexts. Dialectical processes allow individuals to test ideas, persuade others, or adopt the views of others. Reality is constructed through shared meaning (Kanuka & Anderson, 1999). Vygotsky (1978) used the term situated cognition to indicate that the context or situation is interwoven with cognition and learning. Knowledge is not simply a mental state. Knowledge consists of a whole system of social interactions in social contexts (Hung & Der-Thanq, 2001).

Conceptual Learning

Marton and Säljö's (1976a, 1976b) research on deep and surface learning identified the need for students to be able to understand the structure of a text before students could

interpret the intended meaning. Laurillard (2012) tied Marton and Säljö's research to Ausubel's (2000) meaningful learning.

Ausubel (2000) contrasted meaningful learning from rote learning. Meaningful learning requires learning material to be nonarbitrary and nonverbatim, and requires the student to have relevant background or anchoring ideas. Ausubel criticized organizing material into small chunks because he believed this increased rote learning. Although meaningful learning requires anchors, or linkages to existing knowledge, there is a modification of newly required information as well as the existing, relevant cognitive structure. Language plays an integral role in the representation, clarification, and understanding of concepts.

Ausubel (2000) explained the assimilation process in meaningful learning. First there must be selective anchorage of the learning material to existing ideas and cognitive structure. Next there is interaction between the existing, relevant ideas and the new information. Meaning of the new information or learning material is a product of the interaction. Finally, linking within memory results in retention or forgetting. Ausubel (2000) wrote the "acquisition of large bodies of knowledge is simply impossible in the absence of meaningful learning" (p. 79). Drill and practice, advance organizers, and concept mapping are strategies used in meaningful learning. Although critical of the process of discovery learning because "the principal content of what is to be learned is not given but must be independently discovered by the learner" (Ausubel, 2000, p. 46), Ausubel wrote the knowledge acquired through reception learning is used in problem-solving.

Ausubel's assimilation process is different from Piaget's assimilation and accommodation. According to Piaget (1970), knowledge is constructed through an

individual's thought process. When new information is consistent with current beliefs, it is assimilated, or incorporated into existing knowledge. When new information is not consistent with current beliefs, an individual may make accommodations and construct new knowledge. An individual grows and constructs new knowledge in an attempt to understand an objective world (Kanuka & Anderson, 1999).

Constructionism

Constructionism draws upon Papert's (1991) work to examine the construction of an object or "learning-by-making" (para 14). The student develops conceptual understanding when attempting to achieve a goal, reflecting on how well action succeeded, and adjusting current conceptions. Papert (1991) shared his idea of "soap-sculpture math" (para 8) to describe constructionism. While working on a mathematics project in a junior high school, Papert passed an art class where he watched students create soap sculptures. Students chose what they would carve, worked on their projects over many weeks, tried different ideas, shared their work, and saw and talked about classmates' projects. Papert aspired to create a similar process for mathematics students and developed ways for students to learn mathematical concepts by building models.

Laurillard (2012) emphasized two types of feedback related to constructionism. "Intrinsic feedback is internal to the action" (Laurillard, 2012, p. 55) meaning that the learner receives feedback from the environment and can improve their action, often without teacher intervention. "Extrinsic feedback is external to the action" (Laurillard, 2012, p. 55) and is usually in the form of evaluation or guidance from the teacher.

Collaborative Learning

Collaboration combines the ideas of social constructivism and experiential learning. Students share and discuss actions and the products they make in a practice environment. "Learning through production" (Laurillard, 2012, p. 57) requires students to discuss, negotiate, and come to consensus about the production of an output which represents what has been learned. An output could be an essay, report, presentation, media product, or performance.

Laurillard (2009) explained the processes within the Conversational Framework come from a "careful analysis of what it takes to learn" (p. 7). In her synthesis of philosophies of teaching and learning, Laurillard emphasized that each is important in the learning process, particularly in formal, academic learning. Because different philosophies prioritize different aspects of learning, all work together in the Conversational Framework. However, there could be an argument made that teachers tend to align themselves with some philosophies more than others. Pratt et al. (2019) described pedagogical validity as alignment between a teacher's actions and the values and assumptions a teacher makes about learning. Teachers choose instructional strategies based on their beliefs about what constitutes good teaching.

Approaches to Learning

Student approaches to learning (SAL) theory conceptualizes teaching and learning. SAL describes what students do when learning and the teacher's role to help students engage in learning activities that produce the desired outcome (Biggs et al., 2001).

Marton and Säljö (1976a) used a phenomenographical methodology to study student approaches to learning. Students were asked to read substantial passages and were then asked questions about the meaning of the passages. Students were also asked open-ended questions

about how they approached the reading. The authors found there were two approaches to learning, deep-level and surface-level approaches. Students using a surface-level approach tended to focus on the text itself and tried to memorize or remember the text. Students using a deep-level approach focused on the intention of the text and tried to look for the point or main ideas.

Marton and Säljö (1976b) found students would change their approach to learning based on the types of questions that were asked of them. For example, asking recall questions such as "what are the five stages of x" led to a surface-level approach. Asking questions about an author's assumptions and conclusions led to a deep-level approach. The authors concluded "students adopt an approach determined by the expectations of them" (Marton & Säljö, 1976b, p. 125).

Entwistle and McCune (2004) also discussed the link between instructional strategies and study strategies, noting students changed approaches depending on the course or teacher. The authors compared six study strategy inventories and noticed descriptive and conceptual overlap that provide further explanation of deep, surface, and strategic approaches to learning.

A deep approach to learning is used when there is an intention to understand. Students are motivated by an interest in the ideas presented. Students are intrinsically motivated and monitor their own learning or metacognition (Entwistle & McCune, 2004). Meaningful learning (Ausubel, 2000) occurs as students relate and structure ideas to grasp main ideas, and engage in critical thinking. Students engage in meaningful learning when they "seek to understand the instructional material, attempt to integrate it with what [they]

already know, [and do] not avoid the effort and struggle of difficult new learning" (Ausubel, 2000, p. 34).

A surface approach to learning is used to memorize material through rote learning, without understanding (Ausubel, 2000). Students focus on reproducing material they receive from the teacher, which they accept without questioning. Students are extrinsically motivated and experience anxiety or a fear of failure (Entwistle & McCune, 2004).

A strategic approach to learning is used to achieve certain grades or achievements. Students focus on time management, effort management, course requirements, and test strategies. Students are achievement or goal motivated (Entwistle & McCune, 2004).

Biggs and Tang (2011) described the need for learning activities to engage students in ways to help them achieve the desired outcomes. To explain the diversity of students who may be in post-secondary classrooms, the authors presented examples of students they named Susan and Robert (Biggs & Tang, 2011). Susan engages in learning by ensuring she has background knowledge (e.g., reading prior to a lecture), has questions she would like answered, and reflects on her learning. Robert is unsure how to be successful and although he attends the same lectures as Susan, he may not have the background knowledge or know what type of learning activities he must engage in to be successful. Susan takes a deep-level approach to learning whereas Robert takes a surface-level approach to learning.

Laurillard (2009, 2013) emphasized the iterations required between teachers and students to allow teachers to understand students' conceptions and provide clarification, re-explanation, and feedback. Success, or failure on an assessment may not provide teachers with information about students' approaches to learning.

Instructional Strategies

Instructional strategies are the teaching-learning activities chosen by teachers to motivate and guide student learning (Laurillard, 2012). Teachers might choose instructional strategies based on the type of learning they are expecting for students, such as discipline-specific knowledge, critical thinking, problem solving, or writing (Angelo & Cross, 1993; Jerome et al., 2017). The following topics are included under instructional strategies: lectures, Gangé's Instructional Events, advance organizers, concept maps, discussion, group work, classroom assessment techniques, and teaching conceptions.

Lectures

There is agreement that, while popular in higher education, the lecture on its own is not an effective instructional strategy (Biggs & Tang, 2011; Laurillard, 2013). Biggs and Tang (2011) argued lectures are a "situation" (p. 133) and not a teaching-learning activity. Where learning takes place, such as a lecture theatre or laboratory, describes the situation. Although teachers frequently rely on verbal presentation of their conceptions to students, "it is a grossly inefficient way of engaging with academic knowledge" (Laurillard, 2013, p. 94).

Gagné's Instructional Events

Gagné (1965, 1985) described nine events of instruction "designed to support the internal processes of learning" (Gagné et al., 2005, p. 194). The nine events of instruction include: gaining attention, informing the learner of the objective, stimulating recall of prerequisite learned capabilities, presenting the stimulus material, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer.

Gaining attention occurs when a teacher appeals to the learners' curiosity. Asking a question or showing media can spark learners' interest in learning more about a particular topic. Informing learners of the objectives provides expectations about the knowledge or skills learners are to acquire. Verbalizing the objectives may help both the learners and teacher stay "on target" (Gagné et al., 2005, p. 196). Stimulating recall of prerequisite learned capabilities involves building on previous knowledge or skills. Presenting the stimulus material requires a teacher to consider the best way to present materials to learners. For example, teachers may provide verbal presentations of concepts, stories, or examples. Demonstrations may be used to show learners how to apply concepts or skills. Providing learner guidance helps learners make connections between existing and new knowledge. A teacher may ask questions or provide hints to help learners see how ideas relate to one another. Eliciting performance requires learners to demonstrate they have learned a concept or skill. This event allows learners to assess whether they have understood a concept and provides an opportunity for the teacher to provide feedback. Assessing performance involves judgement by the teacher as to whether learners have given the "appropriate performance" (Gagné et al., 2005, p. 200). The authors wrote that assessment must be reliable so there is no chance that learners have simply guessed the correct response or performance. Assessment must also be valid so the teacher is confident that performance reflects the learning objective. Enhancing retention and transfer helps learners to recall the knowledge or skill in future situations. Providing opportunities for practice or transferring learning to different situations can help enhance retention.

Advance Organizers

The use of advance organizers is a way to help students be ready to learn new material by bridging the gap between what they already know and what they need to know to be able to learn the new material. Students are presented with advance organizers before they are presented with the new material to help enhance the stability or clarity of anchoring ideas in existing cognitive structures, as previously described under conceptual learning. Additionally, advance organizers provide a connection to the new material. Advance organizers are more general, abstract, and inclusive than the new material and are presented to students before the new material. Advance organizers are not summaries or overviews because usually summaries and overviews are presented at the same level or abstraction and generalization as the material itself (Ausubel, 2000). Advance organizers can be created in multiple formats including verbal presentation by the teacher, prereading, flow charts, diagrams, self-assessment quizzes, or discussions (Ausubel, 2000; Garrison & Vaughan, 2008). The idea of advance organizers providing a hierarchy is key. This contrasts with, for example, the way some textbooks organize material topically.

Concept Maps

Concept maps are "graphical tools for organizing and representing knowledge" (Novak & Cañas, 2015, p. 1). Concepts are included in boxes and circles which are linked together by lines with linking words and phrases. Cross-links show the relationship among various concepts. Concept maps are organized in a hierarchical format with the most general and inclusive concepts at the top, and with more specific concepts organized hierarchically below. A "focus question" (Novak & Cañas, 2015, p. 1) provides the context around which to organize knowledge.

Concept maps are based on Ausubel's (2000) ideas of assimilation (as discussed previously) and students' cognitive structures and act as a way to represent students' knowledge. Therefore, concept maps can be used as both a learning and an evaluation tool for complex knowledge frameworks (Novak & Cañas, 2015).

Discussion

Discussions can be teacher-led or student-led, small group or large group, structured, or unstructured (Laurillard, 2012). Peer discussion draws upon ideas of social constructivism and allows students to articulate their understandings, offer explanations, critique their peers' articulation, and provide alternatives. However, Laurillard cautions that without guidance from the teacher, peer discussion, on its own, may not lead students to what they are supposed to know. Teachers provide explanations and clarify misunderstandings that arise during discussion. Discussion with large class sizes runs the risk of allowing some students to have a vicarious experience of the discussion, listening to others rather than articulating ideas themselves. Although hearing others' ideas can help address confusion or misconceptions, Laurillard emphasizes it is not the same as having to express an idea, having it challenged, and finding a resolution for the discrepancy.

Toledo (2015) wrote Socratic questioning can create robust learning for students by guiding "students through the critical thinking process" (p. 275). Teachers and students ask questions that challenge common assumptions, ask for evidence, clarify viewpoints, or explore consequences. The purpose of Socratic questioning is to create a conversation that explores a topic or concept rather than determining the correct answer. For this to happen, students must feel safe sharing their thoughts, as well as asking and answering probing questions. Examples of probing questions include the following.

- How does this relate to our discussion issue?
- What could we assume instead?
- What would be an example?
- What effect would that have?
- How can we find out?
- To answer this question, what other questions must we answer? (Toledo, 2015, p. 276)

Laurillard (2013) questioned the use of Socratic questioning, describing examples of Socrates teachings as "authoritarian" (p. 76). "[The Socratic method] is a rhetorical method that gives all the responsibility to, and therefore achieves all the benefit for, the teacher" (Laurillard, 2013, p. 76). Biggs and Tang (2011) described Socratic questioning as convergent questioning. Teachers guide students towards a correct answer. Divergent questions are open-ended and probe student experience for new ideas or to encourage student reflection.

Group Work

Group work provides student-student interaction which can help students identify gaps in their understanding, hear different interpretations, or see different approaches to solving problems. Students require sufficient background knowledge to contribute to group work. Examples of group work include peer teaching, brainstorming, or problem solving (Biggs & Tang, 2011). Group work may be collaborative, which Laurillard (2012, 2013) described as students negotiating to generate a shared output.

Biggs and Tang (2011) wrote case-based learning is frequently conducted in groups. Case-based learning facilitates the application of theoretical learning. Real-world or

hypothetical cases encourage problem-solving and reasoning within a particular context or practice, such as business or health (McCabe et al., 2009).

Classroom Assessment Techniques

Angelo and Cross (1993) described classroom assessment techniques as ways to continually monitor student learning, and to provide feedback to teachers about their own effectiveness. Classroom assessment is formative and therefore is rarely graded and focuses on student learning. The authors recognized that in addition to acquiring knowledge and skills, students may also require help to develop their metagonitive skills or "skills in thinking about their own thinking and learning" (Angelo & Cross, 1993, p. 4). The authors identified six teaching goal clusters: higher-order thinking skills, basic academic success skills, discipline-specific knowledge and skills, liberal arts and academic values, work and career preparation, and personal development. Examples are included in Table 1.

Table 1

Examples of Classroom Assessment Techniques

Teaching Goal Cluster	**Classroom Assessment Techniques**
Higher-Order Thinking Skills	Analytic memo: one or two-page analysis of an issue, usually written for an employer, client, or stakeholder. Categorizing grid: students categorize a list of terms, images, or equations into two or three categories. Teacher-designed feedback forms: students answer multiple-choice, Likert-scale, or short answer questions. For example "rate the clarity of today's session" (Angelo & Cross, 1993, p. 331).
Basic Academic Success Skills	Background knowledge probe: students answer a short questionnaire, made up of open-ended, short-answer, or multiple-choice questions, to provide feedback on prior learning. Minute paper: at the end of class, students take one minute to write key, meaningful things they learned, questions they still have, and anything else they do not understand. This acts as a way for students to reflect on their learning.

	Muddiest point: students write down the most unclear or confusing point from a class or topic.
Discipline-Specific Knowledge and Skills	Annotated portfolios: students submit examples of their work along with their commentary on the significance of the examples. What's the principle: students are presented with problems and state the principle that best applies to each problem. Student-generated test questions: students write test questions for a particular topic. The relevance of questions, clarify, and range of topics provide feedback to the teacher.
Liberal Arts and Academic Values	Double-entry journals: students first make notes on the ideas and arguments in course readings they find most meaningful. The second entry explains the personal significance of the passage, thus students engage in dialogue with the text and explore their reactions. Everyday ethical dilemmas: students respond anonymously to a short case study that poses an ethical problem. Students identify and connect their values to course-related issues. Invented dialogues: students begin by selecting and weaving together quotes and then invent reasonable quotes that fit the character of the speaker and the context.
Work and Career Preparation	Course-related self-confidence surveys: students answer simple questions to help the teacher assess their level of confidence. For example "indicate how confident you feel about your ability to do the various kinds of problems listed below" (Angelo & Cross, , 1993, p. 277). Electronic mail feedback: students submit a response to a teacher's question by email. Diagnostic learning logs: students document main points of classes or assignments they understood and they found unclear. Students regularly reflect on, analyze, and summarize the information on their learning, identifying strengths and weaknesses, as well as possible remedies.
Personal Development	Classroom opinion polls: students indicate whether they agree or disagree with particular statements. Teachers can determine whether pre-existing opinions might distort or block the instructional message. Group-work evaluations: students complete simple questionnaires on their reactions to cooperative learning. Teachers and students can see what is going well and potential conflicts. Exam evaluations: students are asked to provide feedback on the type of test or question, or indicate how the test could be improved.

Teaching Conceptions

Pratt et al. (2001) wrote teachers' actions are informed by teachers' intentions and beliefs about teaching and learning. What teachers do, or the instructional strategies they choose, align with what teachers are trying to accomplish and their philosophies of teaching and learning. Actions are the activities or techniques used in teaching. Intentions relate to what teachers are trying to accomplish. Beliefs come from values and assumptions about what it means to be an effective teacher. From Pratt's (1992) research, a Teaching Perspectives Inventory (TPI) and five perspectives or conceptions of teaching emerged: transmission, apprenticeship, development, nurturing, and social reform (Pratt et al., 2001). A transmission perspective focusses on the content or subject matter. Teachers are responsible for presenting content accurately. An apprenticeship perspective requires students to perform tasks within their zone of proximal development. A developmental perspective plans teaching from the student's point of view to ensure the development of cognitive structures. A nurturing perspective encourages students by providing clear expectations in a climate of caring and trust. A social reform perspective encourages critical thinking with a goal of social action (Pratt et al., 2001). Teachers may have more than one dominant perspective, which allows teachers to adapt to different contexts. Perspectives change and develop over time and with experience (Maggio et al., 2018).

Learning-Centred or Learner-Centred

Laurillard's Conversational Framework (2012, 2020) places the student at the centre, with the focus on learning. Although the literature emphasizes learner-centred environments (Blumberg & Pontiggia, 2011; Wiemer's 2002), the terms learner-centred and learning-centred seem to be used inconsistently in the literature. McCombs (2000) wrote learner-

centred education combines a focus on both individual learners and learning. Individual learners may have different experiences, interests, skills, or backgrounds. Learning considers cognitive, motivational, and developmental factors.

Sadler (2012) contrasted teacher-centred/content-oriented and student-centred/learning-oriented, which he described as two main conceptual categories. A teacher-centred/content-oriented view believes teaching is about providing information or content to students. A student-centred/learning-oriented view focuses on changing students' way of thinking about concepts or phenomena. According to Sadler, teachers with a student-centred, learning-orientated conception of teaching would tend to see knowledge as being socially constructed and would therefore help students develop a personal interpretation of concepts. Additionally, teachers with a student-centred, learning-orientated conception have an expanded awareness of teaching and would consider a variety of teaching strategies. Sadler conducted a study of 11 teachers with less than two years of teaching experiences in higher education in the United Kingdom. Over a period of two years, the participants engaged in teaching development programs and were interviewed using a phenomenography approach. Over the course of the study, participants increased active learning of students by incorporating questions, case studies, or discussion groups. Participants used expressions like active involvement, inspiring and challenging, behaving like professionals, a comfortable learning environment, and students having to think for themselves. However, the teachers noted that the content of a course and their experience teaching a course influenced their teaching and learning strategies.

Blumberg and Pontiggia (2011) proposed a tool to benchmark learner-centredness. The authors expanded on Wiemer's (2002) five dimensions of learner-centred teaching: the

function of content, the role of the instructor, the responsibility for learning, the purposes and processes of assessment, and the balance of power. Having a tool to measure instructors' teaching strategies was seen as a way to help instructors evaluate whether they would like to implement more learner-centred approaches as well as a way for academic leaders to assess their programs or curriculum. For example, the role of the instructor included components such as creating an environment for learning that accommodates different learning styles; alignment of objectives, teaching and learning strategies, and assessment; learning activities that involve students and the instructor; SMART objectives; and the use of motivation strategies.

Later, Mostrom and Blumberg (2012) used the term *learning*-centred rather than *learner*-centred when describing similar concepts. The authors explained three behaviours characterizing learning-centred teaching: "a shift in responsibility for learning towards students and away from the instructor, active student engagement in the course material, and formative assessment opportunities for students" (Mostrom & Blumberg, 2012, p. 399). Drawing from Blumberg's (2009) earlier work the authors provided examples of student and instructor activities in learning-centred teaching. Students are able to take responsibility for their learning when instructors teach students how to learn within a particular course or discipline. Active engagement with course materials could include activities such as constructing concept maps, discussing material with classmates, interacting with web or publisher resources, or taking quizzes related to reading assignments or exams. Formative assessment, provided before a graded assignment is completed, allows students to learn from their mistakes and improve their conceptual understandings. Mostrom and Blumberg emphasized that a database search for learning-centred teaching resulted in terms that the

authors did not believe exemplified learning-centred teaching. These terms included "independent study, student control of the content, self-paced instruction, self-grading, or individualized instruction" (Mostrom & Blumberg, 2012, p. 401). However, further distinction of what did not constitute learning-centred teaching was not provided.

Weimer (2013) stated a learner-centred approach to teaching "engages students in the hard, messy work of learning" (p. 15) by giving students control of the learning process. A learner-centred approach aligns with constructivism where students interact with the content rather than passively receive information from a person of authority. The focus is on what the students are doing, such as working in groups, actively participating in activities, sharing ideas, listening to and evaluating the ideas of others, and interacting with the instructor. Weimer cautioned against minimizing the role of the instructor in a learner-centred approach to teaching. She described an active instructor in the role of facilitator, guide, or coach. Instructors do not leave students on their own and do more than simply create environments for learning. Weimer used the analogy of a sports coach who actively engages with players during practice and games to help them improve their performance.

Approaches to Teaching

Trigwell and Prosser (2004; Prosser & Trigwell, 1999) examined differences in how university teachers approach teaching. The authors' work evolved from research around approaches to student learner to determine whether there was a relation to teaching approaches. Five categories of approaches to teaching were created from their research and are shown in Table 2.

Table 2

Approaches to Teaching

Approach	**Strategy**
Approach A	Teacher-focused strategy with the intention of transmitting information to students The focus in this approach is the transmission of facts and skills related to the discipline, and not the relationship between facts and skills. Prior knowledge of students is not considered important. Students are not viewed as active in the teaching process.
Approach B	Teacher-focused strategy with the intention that students acquire the concepts of the discipline There is an assumption that students acquire concepts of the discipline by being told about concepts and their relationships. Students are not viewed as active in the teaching process.
Approach C	A teacher/student interaction strategy with the intention that students acquire the concepts of the discipline Teachers provide information about concepts to students; however, students are viewed as actively engaging in the teaching-learning process.
Approach D	A student-focused strategy aimed at students developing their conceptions Teachers use a student-focus strategy to help students further develop conceptions they already have. Students are viewed as constructing their knowledge.
Approach E	A student-focused strategy aimed at students changing their conceptions Students are viewed as re-constructing their own knowledge to create a new conception. Teachers focus on what students are doing in the teaching-learning situation.

Adopting a student-focused strategy aimed at changing student conceptions "is more likely to lead to high quality student learning" (Trigwell & Prosser, 2004, p. 419). Approaches D and E use student-focused strategies aimed to help students develop or change conceptions. The focus is on learning.

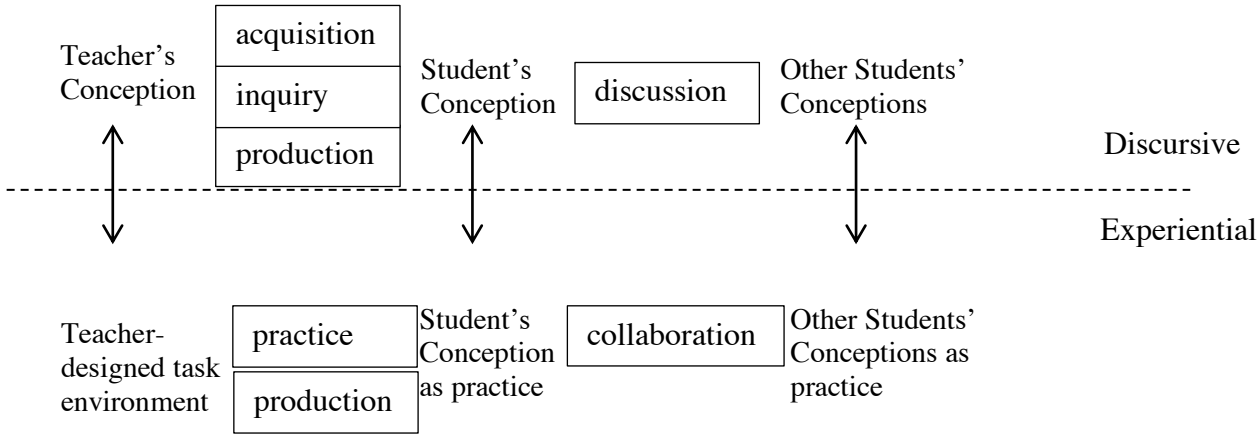
Learning Types

Laurillard described six learning types to explain the activities required for learning within the Conversational Framework: acquisition, inquiry, practice, production, discussion,

and collaboration. Laurillard's learning types help clarify learning-centred approaches to teaching. The learning types are placed within the framework in Figure 2.

Figure 2

Learning Types



Acquisition. Learning through acquisition occurs when the teacher communicates concepts and ideas. Students do not generate ideas, but rather listen to presentations, watch demonstrations or video, listen to podcasts, or read assigned readings. Teachers take the lead and direct activities (Laurillard, 2012).

Inquiry. Inquiry allows students to investigate a range of materials and resources (e.g., a person, library, or websites). Teachers provide guidance or prompting; however, students are more in control. Learning involves investigation, exploring, and questioning. As students find information, they generate new questions and determine what to look for next. Although Laurillard (2012) describes inquiry as an individual activity at the discursive level, it seems inquiry would also be used during practice and collaborative activities.

Practice. Teachers create environments or activities in which students are asked to achieve a goal. Students generate an action, receive intrinsic feedback, and revise their

action. Iterations during practice help learners develop both concepts and practice skills. Activities could include practice exercises, laboratories, simulations, or field trips and are completed at an individual level (Laurillard, 2012).

Discussion. The social construction of ideas occurs when students engage in discussion with their peers. Teachers start the discussion by posing a question or presenting an issue. Generating questions, receiving feedback from their peers, modifying their ideas, and responding helps students develop conceptual understandings (Laurillard, 2012).

Collaboration. Learning occurs through practice when students share ideas, engage in practice, and negotiate a common output. Collaboration brings together learning through discussion, practice, and production (Laurillard, 2012).

Production. Students reflect on their learning, connecting different ideas, and consolidate what they have learned by articulating their conceptual ideas. Production of an output, such as reports, essays, or performances, generates a representation of learning. Extrinsic feedback is provided by the teacher, usually as a form of assessment, in order to further guide learning (Laurillard, 2012).

Laurillard's (2012) learning types highlight the ways the Conversational Framework is *learning*-centred. Regardless of the individual learners, certain types of learning activities would be appropriate to accomplish learning goals within the framework. Learning-centred education recognizes students come to a learning situation with different experiences, backgrounds, and knowledge. Trigwell and Prosser (2004) found student-focused strategies result in higher quality learning. However, student-focused strategies do not consider learning preferences of individual students, but rather focus on what students are doing in the teaching and learning process to construct knowledge and develop conceptions.

Summary of Literature Related to Learning in a Post-secondary Environment

The literature review to this point has focused on what is required to learn in a formal, academic setting. Laurillard's (2009, 2013) Conversational Framework provides a theoretical framework to view the interrelationships among philosophies of teaching and learning, student approaches to learning, instructional strategies, teaching conceptions, and learning-centred education. Laurillard (2013) explained formal academic learning is different from every-day, experiential learning. Academic learning requires contextualization or mediation by the teacher. However, Laurillard (2012, 2013) included philosophies of teaching and learning that also explain every-day learning and development in her synthesis of what it takes to learn.

Literature about student approaches to learning emphasized the need for students to take a deep approach to learning to understand or engage in meaningful learning. Instructional strategies are designed to motivate students to take a deep approach to learning. According to Pratt (1992; Pratt et al., 2019), choices of instructional strategies must align with a teacher's values and assumptions. However, Maggio et al. (2018) wrote "teaching is a socially constructed role that is written and authorized by society (or a professional community) well before it is enacted by any particular person" (p. 1130). Teachers may choose instructional strategies, not for the reasons outlined in the literature review, but due to other "expected norms" (Maggio et al., 2018, p. 1130).

The Conversational Framework outlines the complexities of the iterations between the teacher and students, and among students. Such complexities may not be clear to post-secondary teachers who do not have backgrounds in the field of education.

My main research question, *what instructional strategies and learning technologies do instructors use to support student learning?* guides an exploration of how and why instructors use particular instructional strategies. My research study builds upon Laurillard's (2009, 2013) Conversational Framework and helps to further understand how decisions around the use of instructional strategies are influenced by teaching conceptions. Laurillard placed student learning at the centre of the Conversational Framework and therefore clarification of learner-centred versus learning-centred education contributes to understanding the Conversational Framework.

Learning Technologies

The remainder of the literature review will consider learning technologies and will include Laurillard's pedagogical categories of learning technologies, learning management systems, next generation digital learning environments, and learning technologies and COVID-19. An overall summary and relationship to my research question will conclude this section.

Learning technologies refer to digital technologies or media used specifically for learning in an academic setting (Laurillard, 2013; Goodchild & Speed, 2019). However, as Laurillard (2013) acknowledged some learning technologies were developed for purposes other than learning. For example, digital presentation tools like PowerPoint were originally developed for business presentations.

Learning technologies have been described as engaging and innovative tools used to enhance learning (Dias & Diniz, 2014; Goodchild & Speed, 2019). Learning technologies can promote deep learning by putting "less emphasis on transmitting information and more emphasis on developing critical thinking by employing learning activities … to engage

students" (Wood, 2020, p. 161). Although students use digital technologies for personal reasons, they are not always confident using learning technologies for formal learning and therefore must learn how to learn using technology (Flavin, 2016; Henderson et al., 2015; Laurillard, 2013).

Pedagogical Categories of Learning Technologies

Laurillard created pedagogical categories for classifying media to help teachers make decisions about the use of learning technologies. Laurillard's categories include narrative, interactive, communicative, adaptive, and productive media. Narrative media include presentational media such as text, graphics, audio, or video. Narrative media are not interactive and do not respond to students' questions or actions. Interactive media are presentational media that also give students some control over the information they receive. For example, multimedia and web-based resources allow students to navigate and select content. Students may be given feedback based on their selections. Communicative media allow instructors and students to engage in discussion or communication. Email, video-conferencing, and online discussion forums are examples of communicative media. Adaptive media are computer-based applications that change in response to students' actions. Adaptive media include simulations and virtual environments. Productive media allow students to build and engage with something. Papert's (1980) Logo allowed students to directly experience geometric concepts through intrinsic feedback. For example, as students type commands to draw a square, students see the result, what they have done correctly or incorrectly, and what additional commands may be needed. According to Laurillard (2013), teachers may incorporate multiple forms of media to meet learning goals. Table 3 lists

possible learning technologies for each pedagogical media category (Hart, 2020; Henderson et al., 2015).

Table 3

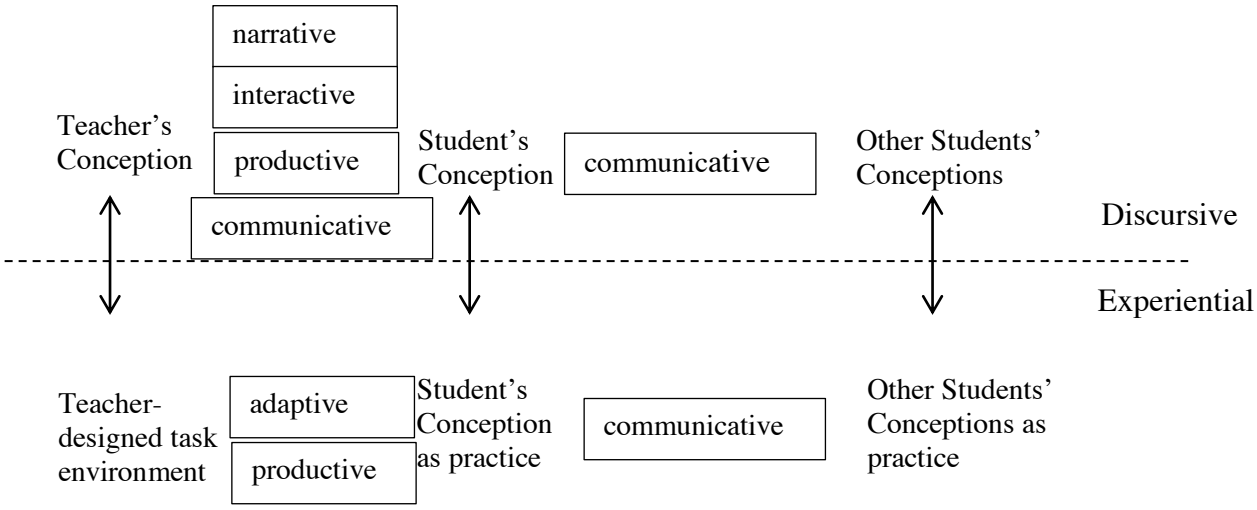
Pedagogical Media Categories and Learning Technologies

Media	**Learning Technologies**
Narrative	YouTube, PowerPoint, Canva
Interactive	Websites, Wikipedia, E-books
Communicative	Zoom, WhatsApp, Google Classroom, Microsoft Teams, Mentimeter, Kahoot
Adaptive	Simulations, Branching scenarios, Minecraft
Productive	Adobe Spark, Camtasia, Google Applications, Jamboard

Figure 3 shows where the different pedagogical categories of learning technologies could fit within Laurillard's Conversational Framework.

Figure 3

Pedagogical Categories of Learning Technologies within the Conversational Framework



Learning Management Systems

The learning management system (LMS, e.g., Moodle, Brightspace, Blackboard, or Canvas) has shaped the post-secondary landscape, becoming ubiquitous in many universities (Altinpulluk & Kesim, 2021). It is often one of the most used technological systems at a university and is required to be accessible 24 hours per day. Deciding upon the next version, technology investments, and training and supporting faculty in the use of an LMS are common technical issues facing post-secondary institutions (Bernardo & Duarte, 2020; Dahlstrom et al., 2014; Wasik, 2020).

Although early LMS collaboration was often limited to text-based discussions, current LMSs can provide tools that allow media-rich learning experiences. Synchronous sessions have audio, video, and application sharing tools. Quizzes or self-tests can have a variety of question types and feedback options. Students can work on documents collaboratively as they develop assignments or presentations. Faculty and students have the ability to post video or audio to introduce themselves, provide content, or discuss concepts. LMS innovations have the potential to transform teaching and learning in both distance and face-to-face environments (Kant et al., 2021).

Despite the development of robust features in recent LMS versions, some faculty members do not make use of the features to transform teaching and learning. According to Galanek and Brooks (2019), students wanted instructors to make more use of the LMS and also wanted to receive training and support on using their university's technology. Pomerantz et al. (2018) found faculty were most satisfied with administrative or course management functions such as sharing course documents and syllabi, pushing out and collecting assignments, and posting grades. The authors found there was lower levels of satisfaction by

both faculty and students for collaborative tools (e.g., discussions or group work).

Next Generation Digital Learning Environments

In an Educause report, Brown et al. (2015) promoted the idea of a next generation digital learning environment (NGDLE), a digital learning architecture containing learning applications, tools, and resources based on open standards to move away from the idea of learning management. The NGDLE may include an LMS; however, an LMS on its own would not create the NGDLE. Brown et al. (2015) described five domains of core functionality of the NGDLE: interoperability and integration; personalization; analytics, advising, and learning assessment; collaboration; accessibility and universal design.

Interoperability and integration. Open standards help to ensure data can be exchanged, transferred, and utilized by the components of an NGDLE. This exchange is required to aggregate and analyze learning data. Integration of tools should be easy for the end user, such as teachers and students, without help from technical support staff.

Personalization. There are two aspects of personalization. The first is about the ability to configure the learning environment to create learning pathways. This type of personalization could happen at the individual teacher and learner level, as well as the department or institution level. The second aspect of personalization is adaptive learning, providing coaching or suggestions to individual learners' needs in ways that could be configured for particular disciplines.

Analytics, advising, and learning assessment. Learning analytics measure, collect, analyze, and report data about learners in order to understand and improve learning. Integrated advising systems target student success in terms of degree or credential completion. The NGDLE requires both learning analytics and advising systems which could

be available through dashboards, viewable from within the LMS or other applications. NGDLE learning assessment includes formative assessments, adaptive learning technology, learning analytics, and integration of portfolios. Requirements to assess learning in terms of competencies draws "attention to another disconnect in that the conventional LMS is organized around the course, whereas competency-based programs typically focus on smaller units of learning" (Brown et al., 2015, p. 7).

Collaboration. Unlike the current LMS, which is often designed as "a mechanism to transmit syllabi, content, and assessments" (Brown et al., 2015, p. 7), the NGDLE should provide students spaces to collaborate with peers beyond the confines of a particular course, using portfolios or tools for content creation. Most current LMS were designed under the assumption that what happens in the course must stay in the course, what Brown et al. (2015) call the "walled garden" problem (p.7) . Although this approach allows teachers to share materials they might not be able to post to a larger audience, and allows students to feel safe to learn within the context of a course, Brown et al. argue the NGDLE should enable a learning community to make choices about privacy.

Accessibility and universal design. Addressing accessibility within the framework of universal design "has the potential to provide the most accessible digital learning environment" (Brown et al., 2015, p. 8). Universal design considers students as both receivers and creators of content because learning involves both reception and expression. Accessibility must be considered when approaching and making decisions on all core functionality of the NGDLE (Brown et al., 2015).

Learning Technologies and COVID-19

In March 2020, post-secondary institutions around the world moved to online learning in response to the COVID-19 pandemic (Decillia, 2021; Kamble et al., 2021; Wasik, 2020). Instructors were required to quickly learn how to use and how to teach with learning technologies. Institutions offered professional development sessions and hands-on practice, provided assistance developing course materials, and invested in learning technologies (Danyluk & Burns, 20201; Pelletier et al., 2021; Tuaychaen, 2021; Waski, 2020).

Synchronous conferencing systems, such as Zoom, Webex, and Google Meet, and the LMS acted as a "lifeline" (Wasik, 2021, p. 3) for instructors and students to interact. HyFlex classrooms, equipped with computers, software, cameras, and microphones, were used to reach students who were on campus as well as those who were online (Rider & Moore, 2021). Laboratory simulations and virtual field trips replaced in-person requirements (Chick et al., 2020; Xie et al., 2020). Instructors turned to learning technologies such as YouTube for video explanations (Bernardo & Duarte, 2020), Padlet and Mindmeister for brainstorming, and WhatsApp and Facebook for discussions (Moluayonge, 2020).

The rapid move to online learning was not without its challenges. Instructors felt unprepared with no time to learn or plan (Decillia, 2021). Issues of inequity surfaced as students reported limited access to computers and stable Internet (Xie et al. 2020). Even when the technology worked as expected, instructors struggled to develop relationships with students and keep students engaged. Both instructors and students reported feelings of isolation and anxiety (Bernardo & Duarte, 2020; Danyluk & Burns, 2021; Decillia, 2021). Instructor workload increased because they had to learn to use unfamiliar technology, find

supplementary materials for students, spend more time on managerial functions, and develop alternative methods for student evaluation (Danyluk & Burns, 2021).

Despite the challenges faced during COVID-19, the pandemic may have accelerated the use of learning technologies and different ways of teaching and learning. Instructors and students experienced flexibility that may not have previously been available. The pandemic has underscored the importance of learning technologies and institutions may continue investments in their technological infrastructure (Danyluk & Burns, 2021; Kamble et al., 2021; Waski, 2020).

Summary of Literature Related to Learning Technologies

Laurillard's (2009, 2013) Conversational Framework and pedagogical categories for classifying media highlight the need to evaluate learning technologies and the ways they support student learning. Although the literature described learning technologies as innovative or supporting higher-level learning skills (Altinpulluk & Kesim, 2021; Xie et al., 2020), learning technologies do not always provide new ways of learning. For example, video may be viewed as innovative; however, video on its own is a narrative media and allows students to learn by acquisition. The LMS is ubiquitous in post-secondary institutions; however, teachers tend to rely on administrative or course management functions. Extending tools and features of the LMS through a NGDLE may provide more opportunities to support student learning (Brown et al., 2015; Pelletier et al., 2021).

Learning technologies are not pedagogically neutral and their use depends on teacher beliefs (Ali, 2020; Bernardo & Duarte, 2020). Literature about the move to online or remote learning during COVID-19 indicated teachers and students do not always know how to use learning technologies in post-secondary learning situations. Teachers also found it difficult to

replicate the complex teacher-student relationship required in teaching and learning (Ali, 2020; Bernardo & Duarte, 2020; Decillia, 2021)

My main research question, *what instructional strategies and learning technologies do instructors use to support student learning?* guides an exploration of how and why instructors use learning technologies. My research builds upon Laurillard's Conversational Framework and how teaching conceptions influenced decisions about learning technologies.

Overview and Synthesis of the Literature

Topics for the literature review were chosen to inform my main research question, *what instructional strategies and learning technologies do instructors use to support student learning?* Laurillard's (2009, 2013) Conversational Framework, as the theoretical framework for my study, guided and influenced the literature review. Central ideas from the literature include the following:

- Laurillard's (2009, 2013) Conversational Framework describes what is required for students to learn in a formal, post-secondary environment. Her framework can be used to design new learning or to evaluate existing learning.
- Laurillard's (2009, 2013) Conversational Framework contains two levels, the discursive and the experiential.
- Philosophies of teaching and learning help educators understand student learning. Synthesis of educational and psychological theories informed the development of Laurillard's Conversational Framework.
- Student approaches to learning (SAL) theory conceptualizes teaching and learning. Research (e.g., Entwistle & McCune, 2004; Marton & Säljö, 1976a, 1976b) found students may take a deep, surface, or strategic approach to learning.

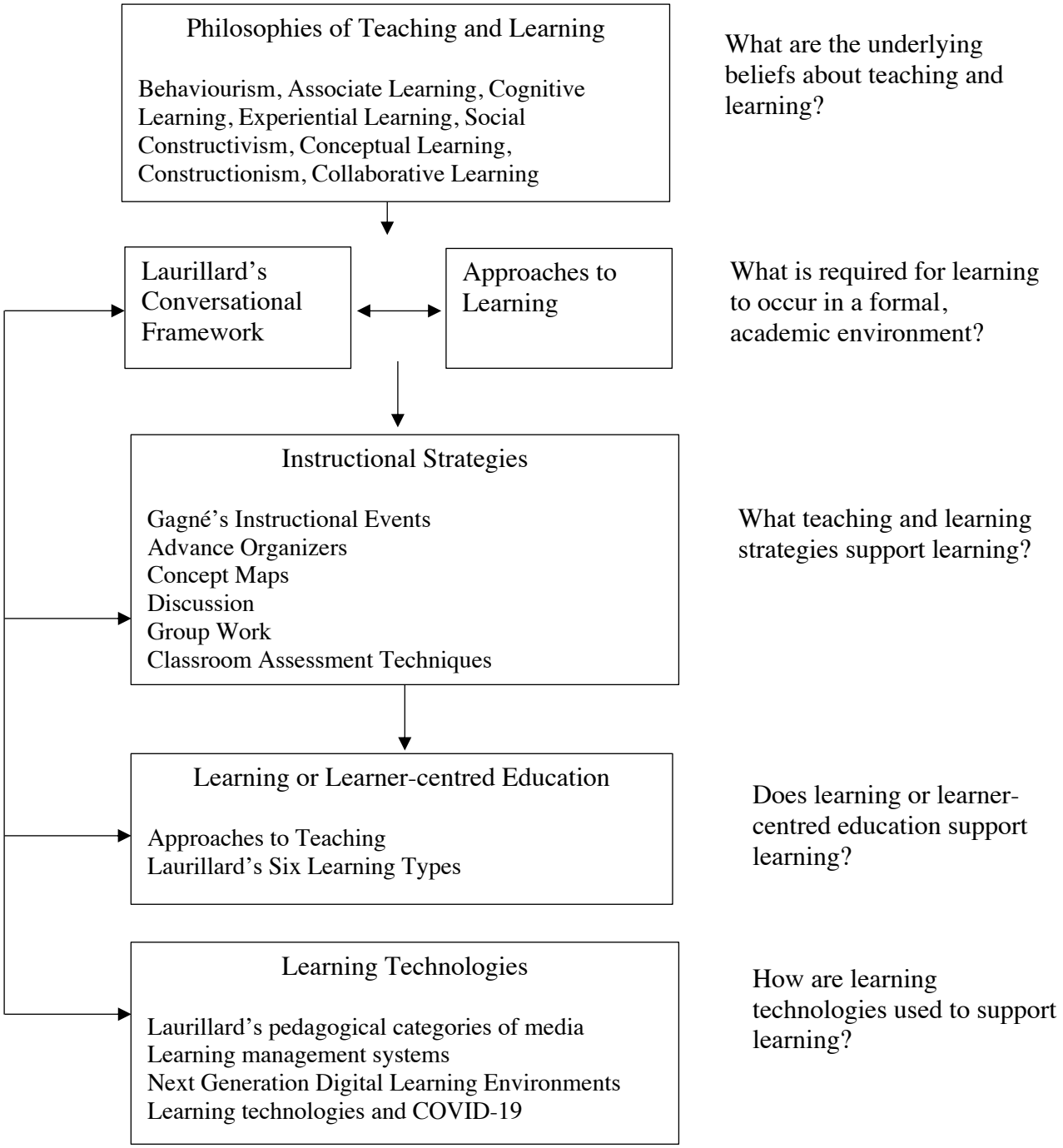
- Instructional strategies are the teaching-learning activities chosen by teachers to motivate and guide students.
- Learner or learning-centred environments focus on how students engage in "the hard, messy work of learning" (Weimer, 2013, p. 15). The terms "learner-centred" and "learning-centred" appear to be used inconsistently in the literature.
- Laruillard (2012, 2020) described six learning types to explain activities required for learning. These learning types help to inform the concept of learning-centred education.
- Laurillard (2013) created pedagogical categories to classify media. The categories allow instructors to determine whether media provide the requirements for learning.
- The LMS has become ubiquitous in post-secondary environments. Despite the availability of a variety of tools and features, Pomerantz et al. (2018) found faculty were most satisfied with administrative or course management functions such as sharing course documents and syllabi, pushing out and collecting assignments, and posting grades
- Next generation digital learning environments (NGDLE) contain five domains of core functionality that focus on learning, rather than learning management (Brown et al., 2015)
- The COVID-19 pandemic caused the rapid movement to online learning and the use of learning technologies. Teachers felt unprepared to teach using learning technologies and issues of student inequity surfaced. COVID-19 may have accelerated the use of learning technologies and alternative ways of teaching and

learning (Bernardo & Duarte, 2020; Decillia, 2021; Kamble et al., 2021; Wasik, 2020).

Figure 4 illustrates the relationship among the various bodies of literature and how they can contribute to understanding how instructors use instructional strategies and learning technologies to support student learning.

Figure 4

Relationship Among Bodies of Literature



Underlying beliefs about teaching and learning may influence how an instructor structures classes, designs learning, and views the role of the instructor and students. An instructor whose educational philosophy aligns with Dewey (1938/1963) may require students to work together to build on their understanding of their interaction with their world (Laurillard, 2013). The use of learning technologies may also be influenced by beliefs about what is required for students to learn within a particular discipline. An instructor may work to create a social constructivist environment that draws upon learner experience, considers past knowledge, and encourages critical thinking, dialogue, and reflection (Merriam & Bierema, 2013). Instructional strategies, and thus learning technologies, may be chosen to support collaboration among students.

As I approached my study, I became cognizant of the complexities involved in exploring how instructors use instructional strategies and learning technologies to support student learning. Laurillard (2013) described academic knowledge as being represented through theories, concepts, symbols, and language. The author's (2009, 2013) Conversational Framework illustrates the ways in which a variety of learning theories, and thus instructional strategies and learning technologies, inform the design of learning within formal post-secondary environments. An instructor may need to present concepts, language, and symbols before students are able to engage in dialogue. There may be requirements within a discipline for students to express knowledge in a certain way. It is also possible that instructors' experiences with learning technologies may cause instructors to reflect on their beliefs about teaching and learning. Figure 4 contains feedback arrows to indicate the relationship among learning technologies, learning or learner-centred education, instructional strategies, Laurillard's Conversational Framework, approaches to learning, and learning theory.

Laurillard's (2009, 2013) Conversational Framework was used as the theoretical framework for my research study and provided a foundation around which to approach and understand my research question (Grant & Osanloo, 2014). The research design and methodology used to explore how instructors use learning technologies to support student learning are described in the following chapter.

Chapter Three: Methodology

This chapter outlines my underlying ontological and epistemological assumptions and explores my role as a researcher in this study. The research methods, including the context of the study, participant selection, data collection, and data analysis will be presented. A discussion of the trustworthiness of the data as well as delimitations and limitations of the study concludes the chapter.

I used a generic qualitative research methodology in my study. Carter and Little (2007) defined qualitative research as social research in which the researcher collects and analyzes text to understand the meaning of human actions and social experience. This differs from quantitative research in which the researcher measures quantity, intensity, amounts, or frequency. Qualitative research examines the world of lived experience by looking at how "social experience is created and given meaning" (Denzin & Lincoln, 2003, p. 14). Qualitative researchers are interested in the socially constructed nature of reality and recognize the intimate relationship between the researcher and the researched within a certain situation or the "complex context of everyday life" (Denzin & Lincoln, 2003, p. 14). In qualitative research, it is the researcher's interest in a topic and point of view that constructs and frames the question for inquiry. Rich descriptions of the social world provide the data of qualitative research.

According to Merriam (2009), generic qualitative research, also called basic or interpretive qualitative research, "attempts to *understand* how people make sense of their lives and their experiences" (p. 23, emphasis in original). In a generic qualitative study, the researcher is attentive to the alignment of the research question, the methodological choices, and the research methods (Kahlke, 2014). Because my study explored participants'

perceptions, a generic qualitative approach was deemed most appropriate to understand the ways in which instructors used instructional strategies and learning technologies to support student learning. Using an interview-based research approach resulted in rich data and thick descriptions which allowed me to maintain participants' voices. I used Laurillard's Conversational Framework to guide my study and the alignment of the research question, methodology, research methods, and theory (Kahlke, 2014).

Methodological questions explore how the researcher should "go about finding out whatever he or she believes can be known" (Annells, 1996, p. 384). The researcher's beliefs about "the nature of reality, the relationship between the knower and what can be known, and how to best discover reality" affect the research question, methodology, and methods (Annells, 1996, p. 379). To examine my location as a researcher, I begin by exploring my ontology and epistemology.

Ontology and Epistemology

Ontology and epistemology "shape how the qualitative researcher sees the world and acts in it" (Denzin & Lincoln, 2003, p. 31). Ontology is the study of being or the way in which we are humans "being in the world" (C. Adams, personal communication, September 7, 2013; Crotty, 1998, p. 45). Ontological questions ask "what is the nature of reality" and further, "what can be known about reality" (Annells, 1996, p. 383). Epistemology is the way we understand "what it means to know" (Crotty, 1998, p. 10). Epistemology involves our understanding of what knowledge is, what kinds of knowledge are possible, and how we gain that knowledge (Crotty, 1998). In order to engage in knowledge construction through research, we must have an understanding of what knowledge is and how it is constructed. Epistemology also shapes how we conceptualize the participant during data collection and

analysis. For example, we may believe that participants are active contributors in the co-construction of meaning, or we may believe that participants are subjects who are studied by an objective observer (Annells, 1996; Carter & Little, 2007).

Personal Ontology. I believe in a world that is "always 'already there' – before reflection begins" (Merleau-Ponty, 1945/1971, p. vii). Although the world always exists, it does not have meaning until we act purposefully in it and create meaning. Our world of lived experience is our way of being in the world. There are multiple ways of being in the world and thus multiple realities. Our reality is created, not only by the natural world of rocks, trees, and water, but also by the cultural, historical, and social events and structures that come from those who live now and who have lived before us (Van Manen, 1997).

Personal Epistemology. Because I believe there are multiple ways of being in the world, I also believe there are multiple ways of knowing. Knowledge is contextual and tentative. Knowledge, or meaning, can be individual or collective.

Dewey emphasized "knowing" over "knowledge." To Dewey, knowledge implied an end product, whereas knowing was a means of inquiry (Boyles, 2006). "Knowledge arises through … [the] acting and interacting of self-reflective beings" (Corbin & Straus, 2008, p. 2). The emphasis on self-reflective beings indicates action does not occur without reflective thinking, during which an individual may determine the best course of action and possible consequences of that action for a given problem. Knowledge gained through action and interaction becomes collective knowledge (Corbin & Strauss, 2008). Collective knowledge is the understanding that comes from human beings before us who have interpreted and communicated their understandings of the world. Crotty (1998) provided an example of a tree, and explained that it has been human beings who have named and ascribed meaning to a

tree, and further that tree may have different meanings "in a logging town [or] an artists' settlement" (p. 43).

From a constructivist view of knowledge, "meaning is not discovered but constructed" (Crotty, 1998, p. 42). "[A]ll knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context" (Crotty, 1998, p. 42). We construct, rather than create or discover meaning, therefore; our existing world and our consciousness interact together to form knowledge. Constructivism provides an "invitation to reinterpretation" (Crotty, 1998, p. 51) by allowing us to approach the world and its meaning with openness. Within a research context, knowledge is constructed through interactions among the researcher and participants. Crotty (1998) used the term constructionism when referring to the "collective generation of meaning" and constructivism when referring to "meaning making activity of the individual minds" (p. 58). I use the term constructivism to refer to both the social and individual construction of meaning as explained in Kanuka and Anderson (1999) and to avoid confusion with Papert's (1991) constructionism.

The Nature of Truth

Van Manen (2014) described two views of truth: veritas and aletheia. Truth as veritas "relies on controlled and controllable methods" (Van Manen, 2014, p. 342) to find an objective and decisive answer to a research question. Veritas would be the truth of quantitative, positivist research. On the other hand, truth as aletheia is an opening up in disclosure to meaningfulness while at the same time guarding the truth in withdrawal. "[T]ruth [is] the constant play of showing and hiding, self-showing and concealment" (Van

Manen, 2014, p. 343).

I view truth as tentative and context dependent. Research may open possibilities for understanding or knowledge at a particular time and place and with particular individuals. We perceive the world as we see it. Knowledge and truth are constructs of our mind.

Ontological and Epistemological Considerations in This Study

The ontological and epistemological context of my research study flow from my personal ontology and epistemology. I explored instructors' experiences and perceptions in an attempt to identify the ways in which instructors used instructional strategies and learning technologies to support student learning. I framed my exploration around Laurillard's Conversational Framework (2009, 2013) to help me to understand instructors' conceptions of teaching and learning and the place of learning technologies to support learning. The way I framed my research topic, approached interviews, and asked questions in turn framed the way that participants shaped their responses (Clandinin & Connelly, 2000).

Constructions of reality involved both the participants and me, as the researcher, and I negotiated my presence in the research as I entered the research scene, interviewed participants, analyzed data, and wrote reports in order to respect the voice of participants (Carter & Little, 2007; Charmaz, 2014). Knowledge constructed during my study may be different from knowledge constructed at a different time or place and with different participants. The knowledge is context dependent and tentative. It is not generalizable.

Methods

While a methodology defines how research should proceed, or provides strategies for approaching research, methods are the tools a researcher may use. "Methodology justifies the methods" (Carter & Little, 2007, p. 1318). Using generic qualitative methods, I attempted to

conceptualize the ways in which instructors used instructional strategies and learning technologies to support student learning at a post-secondary institution within Alberta before COVID-19. An interview-based study allowed me to hear and represent multiple perspectives to address my research question and sub-questions. Sampling was based on the availability of participants and their ability to provide data that contributed to conceptual understanding.

Context. I conducted my study at a teaching university in Alberta that offered full-time, part-time, and online education in both undergraduate and continuing educational programs. There were multiple faculties, each headed by a dean, and departments within each faculty, each led by department chairs. A bicameral system of governance was in place. Academic decisions began at the department level and then proceeded through governance bodies of faculty councils, an academic planning committee, and a final governance council. The academic planning and governance councils maintained at least 60% of the membership as faculty members. The university had a strategic plan guiding priorities, including academic priorities in governance decisions.

A centralized library provided services to faculty, staff, and students. Librarians provided support to use the library resources, particularly online databases. They also assisted faculty in the development of research assignments to ensure directions were clear for students and to ensure library staff were able to help students if asked. Library orientations were offered in both face-to-face and online formats to students. An electronic reading room allowed faculty to work with library staff to make resources available to students.

Information technology (IT) installed software, repaired and upgraded hardware, maintained the network, servers, email, LMS, and other learning systems. IT worked closely with vendors and community partners. An IT policy framework had been developed with faculty involvement. Faculty and staff were involved in the creation, review, and recommendation for approval.

A specialized team supported faculty and staff in the use of the learning management system (LMS) and other university supported learning systems. One-on-one, just-in-time, and training sessions were available. Staff also worked with department chairs to create customized workshops. This support team worked with technology support to provide support to students.

Participants. Purposeful sampling (Oliver, 2010) was used to select 12 post-secondary instructors who incorporated learning technologies into their teaching to support student learning. Twelve participants were selected based on a willingness to participate in my study. Participants were selected from two faculties that had instructors who acted as leaders to support other instructors in the use of learning technologies to support learning. The faculties were chosen if they answered "yes" to the following questions (i.e., criteria):

- Is there an overall direction to use learning technologies to support teaching and learning within the faculty?
- Are instructors identified to lead and support other instructors in the use of learning technologies?
- Does the faculty provide supports to faculty leaders through things such as release time, opportunities to show-case teaching initiatives, or professional development?

Initial potential participants were selected from a list of Distinguished Teaching Award winners and invited to participate. The Distinguished Teaching Award list was used because names of instructors were posted on an easy-to-access web site and winners may be interested in participating in a study about teaching and learning. I asked contacts I had in the two faculties for names of potential participants. Snowballing was also used to select and invite participants. All three methods of identifying potential participants resulted in many of the same instructor names. Perhaps this was because the university, and thus faculties, were small and there were a limited number of instructors. Certain instructors may be identified as technology users by their colleagues, or there may be groups of instructors who know each other and do not think of instructors who are less involved with their colleagues.

I sent a letter by email to potential participants (Appendix A) indicating the nature of my study and the participants' involvement. One follow-up email was sent. If instructors indicated that they were interested in participating, a tentative interview time was scheduled and I sent them a copy of an information letter and consent (Appendix B). I asked participants if they would prefer meeting in their office or another location of their preference to ensure participants were comfortable in the interview setting. Ten interviews were conducted in instructors' offices. Two interviews were conducted in meeting rooms in the instructors' departments. Three faculty members did not respond to my invitation to participate and two indicated that they were interested but were unavailable to schedule an interview time. At the beginning of the interview and before recording, I reviewed the information letter and consent, emphasizing the voluntary nature of their participation, that they were able to drop out at any time up to one month after I had provided transcripts and descriptive summaries of the interviews, and how they could indicate that they wanted to

drop out. I indicated that confidentiality would be maintained by storing files on an encrypted hard drive, using pseudonyms for their names, not including course numbers or course titles, and by reporting findings at a thematic level. The participants are presented in Table 4.

Table 4

Research Study Participants

Participant Pseudonym	**Faculty**	**Years Teaching in Post-secondary**	**How participant learned about teaching and learning**
Ben	Business	13	Instructional skills workshop, mentoring from colleagues and department chair, reading books, occasional professional development workshops, trial and error
Brent	Business	19	Professional development workshops, instructional skills workshop, educational conferences, working with colleagues
Brandon	Business	35	Self-taught (playing with software, reading), seminars, experience
Bjorn	Business	15	Teaching development program and mentor when teaching as a graduate student, peer teaching reviews
Bill	Business	35	Undergraduate degree in education, experience teaching, instructional skills workshop, professional development workshops
Brad	Business	5	Mentoring from colleagues, professional development workshops
Halina	Health	6	Reading articles and books, professional development workshops, mentoring from colleagues
Haley	Health	28	Undergraduate course on teaching and learning, mentoring from colleagues, reading, continuing education courses, community of practice
Harmony	Health	18	Conferences, talking with colleagues, PhD with education focus, a few professional development workshops, trial and error

Hanson	Health	15	Professional development workshops, PhD with focus on learning theories and pedagogy
Hope	Health	11	Undergraduate course on teaching and learning, experience, reading, mentoring from department chair, talking to colleagues
Helen	Health	13	PhD in education, reading, talking with colleagues

Data Collection. I conducted a first pilot interview and initial data analysis to improve my interview guide and my interviewing skills. Interviews were used to obtain in-depth information about the experiences of instructors who taught at a university in Alberta. A semi-structured interview guide allowed me to collect comparable data from participants, engage in conversation, and explore new topics as they emerged during interviews. The interview guide was based on a checklist of questions for the Conversational Framework (Laurillard, 2009) and is included in Appendix C. The one-hour interviews were recorded and I made notes. The recording allowed me to later review the interviews to capture ideas that I may have missed. Notes provided cues for me to follow up with participants during the interview and later supplied ideas for themes. Additional notes were made after each interview in a self-reflexive journal to immediately capture thoughts or ideas that may not be included in the recording. Data analysis began after the first interview, to inform future interviews, and continued throughout the research project.

Analysis. Data collection and data analysis was an iterative process, whereby I transcribed and analyzed each interview as it was conducted. Transcripts and descriptive summaries were shared with participants to check that I had adequately captured their experiences and understandings. Descriptive summaries were provided to participants because they may not have had the time to review a complete transcript. Initial interviews

were used to refine my interview guide in order to further explore new topics. The analysis process was both deductive and inductive and included line-by-line coding, identification of categories, comparison of categories, conceptual labeling of categories, and an explanation of the relationships among the concepts. While the process is listed as, what seems to be, a number of formal steps, interpretation can be more of an art than a formal method (Corbin & Strauss, 2008). I moved back and forth through the comparative analysis process to refine and develop conceptual categories.

As part of a self-reflexive journal, I recorded questions or ideas that arose during the study, decisions I made during analysis, and why I made the decisions that I did. I used the journal to revisit and refine my analysis and to discuss my analysis and coding with a colleague who has agreed to review the development of concepts and categories. A colleague with a doctoral degree in education and who was familiar with teaching and learning using learning technology was able to provide feedback, ask questions about coding to help me remain open to emergent categories, and explore items I had missed or had taken for granted.

Ethics. Following Tri-Council requirements, formal ethics approval was obtained from the University of Alberta and the post-secondary institution at which I conducted my study. The purpose and nature of the study was explained to potential participants when they are invited to participate. This information was also included on an informed consent, along with information indicating their ability to drop out of the study at any point in time. Confidentiality was maintained by using pseudonyms for faculty members' names and departments, password protecting recording devices and my computer, and storing hard copy research materials in a locked cabinet.

Relational ethics (Noddings, 2012) provides a framework to shape research questions,

consider interview questions, structure an interview conversation, analyze data, and write reports. Relational ethics stresses empathic listening, attending to participant responses, and being receptive to responses in an open way that constructs a relationship between the researcher and participants. Attentive, empathic listening is different from "listening only for our own purposes" (Noddings, 2012, p. 55). Relational ethics recognizes the values of mutual respect and connectedness of the participants and researcher.

Ethical matters do not end once ethics approval is received, but continue through the duration of a study (Clandinin & Connelly, 2000). Consideration of ethics continues as the researcher determines how to leave the scene and share results in ways that best represent participants' voices (Tracy, 2010). I believe it was a privilege to explore participants' experiences, reflections, and actions as part of my research study. I also recognize there may be a limit to the extent that participants were willing to share. I approached my study with the attitude that respect for participants is more important than obtaining data.

Trustworthiness. Credibility, transferability, dependability, confirmability, and authenticity are listed in the literature as the criteria for examining the trustworthiness of qualitative research (Cope, 2014; Denzin & Lincoln, 2003; Shenton, 2004). However, some authors question the usefulness of such terms. Williams and Morrow (2009) wrote that, of primary importance is an understanding of the underlying premises, worldviews, or paradigms with which the researcher approaches a research study. Different approaches may have unique ways of achieving trustworthiness and researchers should clearly articulate their methods and analytic strategies within their research writings. Alternative categories with which to examine trustworthiness include: integrity of the data, balance between reflexivity and subjectivity, and clear communication of findings (Williams & Morrow, 2009). Morse et

al. (2002) argued evaluation strategies, whatever the terminology, should be "built into each phase of the research strategies [and]… act as a self-correcting mechanism to ensure the quality of the project" (p. 4). Morse et al. (2002) criticized strategies such as audit trails because the authors see these as simply documenting decisions rather than guiding the decisions that are made. The authors further suggested that member checks could cause a researcher to keep analysis at a descriptive rather than conceptual level in order for participants to "recognize themselves or their particular experiences" (Morse et al., 2002, p. 7). While authors may disagree over terminology or the appropriateness of certain strategies, there is agreement on the importance of striving for rigour and quality in qualitative research.

Credibility refers to whether a research study measures or tests what is intended, or that a study adequately records a phenomenon (Cope, 2014; Shenton, 2004). A research study should be plausible (Tracy, 2010) or present possibilities of human experience (Van Manen, 2014). A qualitative study is considered credible if the descriptions of human experience can be recognized by individuals who have had similar experiences (Cope, 2014). I recorded and transcribed interviews to increase the accuracy and completeness of the data. I asked participants to review descriptive summaries of interviews to check that I had captured their experiences accurately. When I moved to data analysis and the development of concepts and categories, I consulted a colleague to provide feedback and challenge assumptions I have made. A self-reflexive journal was used, not only to document decisions made during data collection and analysis, but also as a way to review and refine my research. The use of a journal increased transparency within the study by documenting my decisions and processes related to analyzing, categorizing, and conceptualizing the data (Tracy, 2010). Finlay (2002) described the muddy ambiguity of reflexivity a researcher must negotiate while

deconstructing the research encounter to examine how the researcher and participants affect each other and how they may even transform the research. Self-reflexivity can unmask complex political and ideological agendas behind our research and our writing. However, Finlay cautioned that just because a researcher has engaged in reflexivity and co-creation does not mean that the study is valid and trustworthy. I used a self-reflexive journal to record and examine questions I had about the interviews, challenges that arose during the study, surprises, and revelations. I attempt to weave evidence of self-awareness throughout the remaining chapters in an attempt to "*show* rather than *tell* self-reflexivity" so the reader can make judgments about my point of view (emphasis in original, Tracy, 2010, p. 482).

Authenticity refers to the extent that the researcher expresses the feeling and emotions of participant's experiences in a faithful manner. I worked to build trust with participants, drawing upon relational ethics to guide my relationship with participants. I felt privileged to share in the participants' enthusiasm for teaching and their students. I ensured participants had informed consent, knew the purpose and nature of the study, and were aware of their ability to withdraw from the study at any point. Descriptive summaries were shared with participants to ensure I had captured their experiences. The inclusion of rich quotes will allow participants' voices to be present in the study.

Dependability refers to the criteria for similar results to be obtained by a different researcher under similar conditions (Cope, 2014). I have included careful description of the research study's context as well as my methodology, analytic process, and reflections to allow others to develop an understanding of my research process (Shenton, 2004). As described earlier, consulting with a colleague and engaging in journal-writing also addressed issues of dependability.

Credibility and dependability are similar to Williams and Morrow's (2009) category of *integrity of the data*. The authors described the need for a "clearly articulated and referenced design or analytic strategy" to provide enough detail to establish integrity (Williams & Morrow, 2009, p. 578). The authors questioned terms such as redundancy and saturation when addressing issues of quality and quantity of data because the diversity of human experience raises questions as to "whether true redundancy is ever possible" (Williams & Morrow, 2009, p. 578). My study was limited to 12 instructors who may have been interested in teaching and learning with technology. Although I received the same instructor names through various sampling processes, and many of the instructors shared similar experiences, my results may not have reached saturation or redundancy.

Confirmability refers to the need for the data and subsequent analysis to represent participants' responses and not the researcher's biases or viewpoints (Cope, 2014). Confirmability can be enhanced when a researcher shares his or her preconceptions (Shenton, 2004). Documenting my ideas, beliefs, assumptions, and questions provided a first step for me to examine my underlying beliefs and assumptions and allow me to share these within any research reports. I have included rich quotes from participants to retain their individual perspectives to show how their responses are related to the abstract categories (Williams & Morrow, 2009).

Transferability allows the readers to assess whether the findings of a study are capable of being a fit or transferable to their own experiences. I provide thick description of the context of the study, including the location, number of participants, methods of data collection, length of time of interviews, and characteristics of the institution (Shenton, 2004).

Confirmability relates to Williams and Morrow's (2009) category of *balance between*

reflexivity and subjectivity. The authors recognized the place of subjectivity in qualitative research but also suggested that researchers practice reflexivity in order to examine their own perspectives and assumptions and to recognize that "their own experiences [are] separate from the participants' stories" (Williams & Morrow, 2009, p. 579). While some of the literature suggests including participant quotes to show participant experiences and meaning, Williams and Morrow (2009) stressed the need to "ground the participants' comments in context" (p. 579) in order to balance between participant meaning and researcher interpretation.

Williams and Morrow's (2009) third category of *clear communication of findings* addresses criteria of transferability and justification. They write that thick descriptions are required to understand the context of the situation or behaviour. The researcher has an "interpretive task of illustrating the meanings of participants in the contexts of their lives" (Williams & Morrow, 2009, p. 580). Justification is how clearly a researcher communicates the research findings and why they matter (Williams & Morrow, 2009). A study that has a significant contribution extends knowledge, improves practice, addresses social conditions, or expands or challenges current theory. Worthy studies "shake readers from their common-sense assumptions and practices" (Tracy, 2010, p. 841). Table 5 summarizes the provisions I made to address trustworthiness in the study.

Table 5

Provisions to Address Trustworthiness

Quality Criteria	**Williams & Morrow Criteria**	**Provision**
Credibility	Integrity of the data	Participant checks of descriptive summaries Colleague review and feedback Self-reflexive journal
Authenticity		Informed consent Relational ethics Rich quotes related to categories
Dependability		Description of context, methodology, analytic process, and reflections
Confirmability	Balance between reflexivity and subjectivity	Self-reflexive journal Rich quotes from participants
Transferability	Clear communication of findings	Thick description of context

Limitations

Limitations of a study are potential weaknesses that are out of the researcher's control. Limitations can be associated to assumptions about underlying theory, the research design, study setting, sample, data collection and analysis, and conclusions (Theofanidis & Fountouki, 2019). My study was limited to 12 instructors at a post-secondary institution within Alberta who incorporated learning technologies into their teaching and learning before

COVID-19. Ease of access and willingness to participate affected selection of participants. A sample size of twelve instructors means data saturation was not likely achieved. Participants may have been interested in teaching and learning, learning technologies, and participating in a research study. They may have read literature or heard presentations about teaching and learning and using learning technologies and their responses may reflect the ideas, opinions, or experiences of others. Truth or knowledge was constructed by participants and me, as researcher, within the context of my study. The findings of my study may not be the same as findings constructed at a different time or place or with different participants.

To address my study's limitations, I completed a thorough literature review and analyzed my findings in relation to the literature. This allows readers to see my assumptions and understanding of Laurillard's Conversational Framework and underlying theories. I provided a description of the context of the study setting. Interviews were recorded and transcribed, and I have included rich quotes in relation to categories, themes, and conclusions. Descriptions of my methodology, analytic process, and trustworthiness have been included in this chapter.

Delimitations

Delimitations are the limitations consciously set by the researcher. They are the boundaries or limits of the study's objectives (Theofanidis & Fountouki, 2019). The study investigated the ways instructors used instructional strategies and learning technologies to support teaching and learning. Interview conversations did not investigate details of how participants' understanding of educational research could inform such use. Experiences of students, support staff, and administrators could provide different perspectives on teaching and learning with technology in a particular class; however, my study was delimited to

instructors' experiences.

Chapter Summary

In this chapter, I have explained the methodological choices made throughout my study. Interviews with 12 post-secondary instructors provided rich descriptive data on how they used instructional strategies and learning technologies to support student learning. The following three chapters present the findings of my study. Chapter four provides insight into the presentational strategies instructors used to help students achieve an understanding of course concepts.

Chapter Four: Teacher's Conception

Laurillard (2009) described the teacher's conception as the presentation of concepts, ideas or theories to students. Laurillard (2009, 2013) wrote that explaining a topic, clarifying the structure, or relating forms of representation to the student can be influenced by presentation capabilities of learning technologies. Teacher's conception also considers teaching perspectives or conceptions which are created through an interaction of actions, intensions, and beliefs (Pratt, 1992; Pratt et al., 2001). Exploring teachers' conception attempts to answer questions such as (a) how can a teacher best explain or present concepts, ideas, or theories to students? or (b) what is needed to help students understand the content? (Laurillard, 2009). This chapter will address the sub-question, *what explanatory and presentational strategies do instructors use to help students achieve understandings of course concepts?* From this sub-question about actions, conversations developed around instructors' teaching conceptions and why they chose particular presentational strategies. Sub-themes within this chapter include (a) teacher's conception by lecture, (b) teacher's conception through readings, and (c) teacher's conceptions through learning technologies. Themes were structured based upon how the instructors who participated in the study thought about their teaching within the context of Laurillard's (2009, 2013) Conversational Framework.

Teacher's Conception Through Lecture

All instructors, except Hope, who taught an online course, discussed verbal presentations as a way to convey course concepts to students. Helen, Brent Brandon, Bill, and Brad described their courses as having lecture and active learning activity components. They believed a combination of verbal presentation and active learning activities was

required for students to learn. Active learning activities, such as discussions will be discussed in subsequent chapters.

There are "two halves to the course. One is theory and one is applied. The theory are lecturettes in class, if you will, and then application of concepts in class time" (Brent). The term *lecturettes* was used by Brent to emphasize short lectures, or verbal presentations which then allowed time for students to apply concepts.

Bill indicated he changed his ideas about teaching which in turn caused him to decrease the time he spent presenting concepts to students.

> I had a pivotal switch in my work because I was training to be a teacher – so the focus is on teaching. So the superintendent comes in to evaluate you and says, writes clearly on the board – check, can hear from the back of the room – check. So they are all teaching skills - they aren't learning skills. So I would say, just over 20 years ago, I started to investigate learning and it shifted my whole idea of teaching…. My work went from teaching to facilitating learning. So consolidating learning rather than a show of teaching. (Bill)

Bill emphasized the short verbal presentations he included in his course, to allow time for active learning activities.

> I would think about half of the class I would do presentation. So, it's with students face-to-face. And the students, I try to engage them so I'll do a short presentation and then an activity that we'll do in the classroom…. I think my maximum time would be ten minutes that I want to deliver content. (Bill)

Brandon lectured during the first classes within a course as a way to orient students to the course, course content, course requirements, and university processes and policies. "The first

class or two [I] talk a lot about all of the course pieces and [university] pieces" (Brandon). Brandon also found verbal presentation helped students grasp the challenging or more difficult concepts within the course. "Once we get into the content of the course, I lecture typically half an hour or less in a 90-minute class. And that's to cover things that I think would be especially challenging in the current chapter" (Brandon).

Helen found that the organization of her verbal presentations was paramount in helping students understand the course concepts. Although the department requested instructors to align topic areas so instructors were teaching a particular topic at the same time across multiple courses, Helen was "very particular about the order in which [she] present[ed] information." She organized her presentations and the course materials to ensure students learned the foundational concepts required to be successful.

> The foundational concepts of [the course] don't fall into neat categories like that. I have learned that if [students] don't have a good grasp of some of the foundational concepts, they are going to struggle all the way through. I spend a lot of extra time on those foundational pieces. (Helen)

Ben and Bjorn presented theory verbally and demonstrated problem-solving to students to help students understand both concepts and practice. " I have a list of these recommended textbook problems. What I would do, and again this is a stuffed course, so I would cherry pick some typical examples … and show that in class" (Bjorn).

Instructors who did not have a traditional class format also incorporated verbal presentations into their course. At the beginning of a worksite placement, Halina provided a verbal orientation to students. The verbal orientation included topics such as worksite

practices, expectations of students, and where students could find digital resources they would be required to use.

Haley provided verbal instruction to prepare students for a high-fidelity simulation event. She explained that her process for using simulation was based upon recent research and professional association standards.

> There's a very well-defined process now with simulation … we will spend anywhere from 20 to 30 minutes before the event. And we just want to ground their learning experience and refresh their focus on concepts…. We establish ground rules … reinforce confidentiality. (Haley)

Background Knowledge

Instructors provided assigned readings as a way for students to gain background knowledge or for "students to be prepared" (Bill) prior to receiving verbal presentation. Haley provided materials students required to prepare for a simulation event. "They would be asked, perhaps read specific articles or sections of chapters … so they may be given guiding questions … questions related to the content or interventions" (Haley). Before students started their worksite placement, Halina required students to complete readings and a short online exam to ensure they had basic, background knowledge.

Instructors provided an introduction or orientation to the concepts that would be presented in class. This was done at the beginning of class to help students better interpret or approach the concepts that would be presented. Bill described, what he called, a "bridge" to the start of class. "I could show a video clip or I might tell a story, or put up a cartoon…. Here's what today's topic is about" (Bill).

Hanson and Helen began classes with an academic article, news item, or review to help students think about the topic.

> I also have something I do at the beginning of each class. I call it open mic time and I bring in some research related to medical knowledge and the study of diseases. And I encourage them to bring news or articles or pieces that they find. [The articles] are not directly testable, it's just a way of sharing and encouraging [students] to access the literature and start looking at being critical about things. (Hanson)

After teaching for approximately five years, Hanson began to use this approach to start classes to "create some excitement, interest in the content and that sort of thing" (Hanson). Helen started her classes with a review of concepts or a presentation of research.

> Every class I start out with information, research related, to whatever concepts we're working on or maybe what we worked on last week. We do a little review of last week and I'll just read headlines of what the latest research is. Or, it might be something that we were talking about [such as] diabetes and I'll send them to the Canadian Diabetes website. It's to provide some variety about how information is presented. (Helen)

Harmony focused on interpreting material for students to ensure students had the background knowledge required to engage in discussions.

> I see the role of the educator as someone to interpret the knowledge. Sometimes when you get students to read three or four articles, the content that I want to pull out is buried depending on whose voice in terms of the author's, sometimes they write very high-level, and it's about bringing to an undergraduate level. So this way I interpreted many, many articles but it gave them some foundational knowledge to then be able to

> discuss and then and [engage] with their peers…. So I guess I tried to level the playing field so everyone had the same knowledge before we had the discussion.

Hope related concepts to prerequisite and future courses to help students recall and remember concepts. "I pull that back to the first course they did so I relate it back to [a] prerequisite course…. You will revisit this … and so please don't forget about it" (Hope).

Difficult Concepts

Instructors acknowledged there may be concepts within their courses that students find difficult to understand and looked at ways to make those concepts clearer for students. Helen explained how she considered different ways to help explain concepts to students.

> I try to present difficult concepts in multiple ways. I often try to give an analogy, maybe give a case sample. If there is something that I can present visually, I might use the whiteboard and draw something. So, I try to approach [the topic] using multiple ways of explaining, because not all students understand things in the same way. (Helen)

Ben approached difficult concepts differently than the way he presented less complex topics in the class. He usually talked about the model or mathematical proof to explain a concept to build in some deeper understanding or intuition for students. However, for difficult concepts he changed his teaching strategy and focused less on the model or proof to prevent overwhelming students.

> I'm careful not to over explain the behind the scenes, what the model may be rooted in. Or, I might explain briefly but we'll focus more on survival and less on the formula and where it came from.… There are about two or three formula where I'll lay off trying to make it intuitive. (Ben)

Harmony used, what she called, a holistic approach in her course, encouraging students to think of clients as a whole, rather than by a diagnosis or symptoms they may have. Because this could be a different way of thinking for students, in addition to learning new concepts, Harmony found she had to change the ways she presented concepts to students. Harmony described professionals as generally having a knowledge component to their practice, application of that knowledge, and a professional identity. She called these knowing, doing, and being. Harmony felt most courses or programs began with the knowledge required for a profession, moved to application, and then concluded with the professional identity. For her class, she switched the order so students considered their professional identity first and then went back to knowing and doing.

> So, I've flipped it so it's really about becoming first, or being first. Because if I don't know who I am as a person, or who I want to be as a [professional], there is no way that I'm going to be able to identify with the [client].… We always front-load the knowledge so I'm trying to flip [the course] so it's instilling our professional values and beliefs and then move into that doing part. (Harmony)

Bill tried to present concepts at a level which students could learn. "When I present, I want it to be just at the spot above where they're at now. I don't want to give them, what I'd call a hard thing, because to me there might be a stumble" (Bill).

Learning How To Learn

Instructors stated students may not know what is required for learning in a post-secondary environment without some guidance. Helen emailed letters to students before the first day of class to welcome students and help them think about how they might want to approach the content within the course by providing study tips and suggestions. She noted

some students struggled with a combination of learning requiring both knowledge and application.

> What I do before class starts is, I send them all a letter … I provide them tips on how to approach learning in this particular class. It's a very difficult class that is a blend of application and some memorization … so it's a struggle sometimes. What I give them is an outline of all the different ways that they can approach learning the content so they get a sense of what's to come and can think about different ways of making notes or reviewing … the chapters ahead of time…. For example, students might decide they want to use recipe cards to make notes or they might want to draw pictures, or mind map, so I give them a layout of what that might look like. (Helen)

Instructors also presented learning objectives to help students learn how to learn. Hope's online course listed learning objectives at the beginning of each module. She used Bloom's taxonomy as a guide. "Bloom's Taxonomy ... trying to build questions that are critical thinking and application and understanding kind of level" (Hope). Hope also provided context to help students learn course concepts.

> Because I think if [content] was just there to read, people could read it. It's the ability to also break some of that down into simpler concepts and some tricks that I've learned over time of how to remember…. When people have context for why something is important it makes it more relevant. (Hope)

Hanson provided learning objectives to students as a way to help them "reframe their study habits [and] understand their responsibilities." He provided "handouts" that contained in-depth unit objectives with examples of what students "should be focusing on and learning from the course."

> I'll show [students] an example of the unit objectives and say to them, "okay, these are how the objectives are set up and worded." Some students take those objectives and actually answer all the questions when they are studying for an exam. (Hanson)

Hanson found spending time at the beginning of the course reviewing study skills such as reading before class, using the handouts, and reviewing diagrams helped students move from having "everything handed to them on a silver platter … it's helping them reframe their study habits and understanding their responsibilities" (Hanson). Hanson also described how he outlined his expectations directly to students. "We discuss [study habits] at the beginning of the course and I try and help [students] succeed in terms of their study habits and how they should utilize the tools I give them" (Hanson).

To help students know what they should be learning or doing, Bill referred to learning objectives throughout a unit or lesson. He then provided an opportunity for students to complete an activity so they could self-evaluate whether the objective had been met. The learning objectives provided a way to structure the learning activities students needed to complete or the learning processes students needed to go through.

> I declare the objectives at the beginning. So, I talk to [students] about what they should be able to do at the end of a lesson. And then during a lesson, I'll try to remind them of what they need to be able to do by the end. And then at the end of the lesson I say to them, "okay, if you've got this lesson down, you should be able to do this. So why don't we practice right now. Here's a problem similar to that. You should leave the room saying 'I've got this.' Or you should leave saying that you need to practice or you need some help." So, I work to make sure they know exactly what they need to be able to do at the end. And at the end they do some kind of a self-test. (Bill)

Presenting learning objectives to students in a detailed way provided a structure to course materials and helped students know what they needed to do, such as complete additional learning or develop study habits.

Teacher's Conception Through Readings

As mentioned previously, instructors assigned reading to provide background knowledge or to help students prepare for class. Hanson provided students an outline of the course content with learning objectives and what "to focus on in their reading." Hanson used diagrams from the instructor's resources from the publisher that "students [found] quite valuable" in understanding concepts. Haley required students to read textbook chapters or articles prior to a simulation event to ensure students had required knowledge, such as medications or supporting someone at end-of-life.

Helen provided a list of chapters students should read for the different course topics and asked "that they read them in advance of the class." The textbook readings provided "written explanation." With the purchase of a textbook, students received access to online resources. "They have study resources that are online. They've got key points for each chapter that can be downloaded … and sometimes they've got some video and they have some animations that are available too. It's a pretty wide variety for [students]." Although resources were available, Helen was not sure how many students accessed the resources. "Some do and some don't. It's a bit of a mix."

Bjorn added his own material to the online textbook as a way to guide students.

> [This publisher resource] is a richer version so you can basically customize a lot of the content in the textbook … there is base content of the textbook but I can add

> written comments, I can insert a video and do all kinds of things that could potentially enhance students' learning. (Bjorn)

Harmony provided students with a variety of journal articles to read during the course. Although some students complained about the number of readings, Harmony provided rationale and suggestions to students.

> I'm very up front and I would say, because some of them would start complaining about how long the reading list is and I say, you can work in groups, so two of you might take one article each or split up the readings … At the end of the day, this is what you need to read to be successful, not only in this course, but in your [professional] practice. (Harmony)

Teacher's Conception through Learning Technologies

Instructors used various types of learning technologies to present concepts to students. While some reasons for choosing technology were logistical, such as using an LMS to offer an online course, other reasons related to instructors' ideas about what students needed to be able to learn.

Teacher's Conception Through Digital Presentations

All instructors used digital presentation tools (e.g., Microsoft PowerPoint, Google Slides) to support the presentation of concepts to students. Instructors used digital presentations to either supplement their face-to-face presentations or to create a recorded narration for students that was posted in the LMS as video. This subsection will address the ways instructors used digital presentations to supplement their face-to-face presentations.

Bjorn used digital presentations to distill content down to the basic concepts for students.

> My PowerPoint slides are quite simplistic. I believe that less is more…. I try to really think, what is the real core issue here? …. I would have some PowerPoint slides with relatively sparse content and then I would talk very freely and use the whiteboard for illustrating something graphically or solving something. (Bjorn)

Bjorn's use of simplistic slides supported his belief that his role as a professor was to help students understand the fundamental, key concepts. He knew students could easily get confused over the course content.

> My role is to really reduce this down into some very basic statistical principles. And that's why I have my PowerPoint slides – to reduce the clutter and say, "these are the four things we are doing in stats." And once they have the skeleton in place, you can easily extrapolate and go in that direction or that direction…. It would be very easy to make it complicated but it's very hard to do it the other way around. (Bjorn)

Bjorn posted his digital presentations in the LMS after class to ensure that the slides matched exactly what was discussed in class. Although some students did not like waiting until after class, he wanted to ensure that students had accurate information.

> I always upload my slides after the class. The reason being is that I have a very good sense of teaching and time roughly where we are going to be. But, you know, some sections are a little bit slower … and I don't want to post things that we haven't talked about. This way they know, what I've posted, we've talked about in class. (Bjorn)

Harmony used digital presentations to help students see the "big picture" and tie concepts together. Like Bjorn, she selected key ideas to present to students. She found digital presentations helped her organize her materials as well as organize her presentation and

discussions with students. However, Harmony cautioned that focusing on getting through the slides might prevent dialogue with students.

> I don't put everything on my slides and sometimes students complain about that. I look at PowerPoint as a way to do guided notes…. It allows for many different media. It allows for verbal and pictures. You can put in video and cartoons. [Pictures provide] something to think about because a lot of us are visual, so it's something that we can look at and it allows us to anchor the discussion…. But I think if you get married to PowerPoint as a way to deliver knowledge and you're very adamant about getting through your slides, then I think it becomes a barrier to having those active discussions. (Harmony)

Helen stressed that she did not like digital presentations tools; however, she found students liked having the materials to decrease the amount of notes they had to take. While Helen acknowledged the benefit to students of not having to take a lot of notes, she did not like students reading the slides instead of listening to her presentation. However, while she saw limitations to the application, like Harmony, she found it useful to organize materials such as graphics, video, or animations.

> I want it to be known that I don't like PowerPoint. I really don't. But I use it because students seem to expect that and don't want to take notes on their own. So, I've got an outline for them. It does give them a visual I guess. I'd rather they hear what I'm saying than read it. Lots of times there are really good animations … or video with speaking and a pictorial example that might be phrased in a different way than me and also gives them something to look at. (Helen)

Hanson found that digital presentation tools allowed him to create "skeleton" materials so students did not write down everything he said.

> I noticed [students] would write every little thing down that I said and I would say to them "stop, maybe we can talk" … so I started to develop the tools with the skeleton notes and freed some people to stop because they weren't constantly feeling that they had to write everything down. They would stop and pause and ask questions and be a little more participatory than just talking notes the entire class. (Hanson)

Bill incorporated polls into his digital presentations. Students answered a survey question using a polling system and Bill generated graphs to show results. He found using student results were more powerful because "often we know the answer [but when] students recognize it, they own it…. They are able to develop the data, analyze the results, and interpret it" (Bill).

Teacher's Conception Through Video or Media

Brandon, Ben, Brad, Harmony, and Hope created video to explain concepts to students. The most common creation of video was a narrated digital presentation**.** Ben found that making videos and posting them for students was one of the biggest benefits technology provided for his teaching. He created video to help explain complicated topics. "I will usually build some kind of animated PowerPoint slides and I would be speaking over it and pointing the mouse. Or I will do it in Excel and point and explain." Ben occasionally used video when another event in the department prevented students from attending class. [If] "there's an employer session and I get notified that five of the really keen students have volunteered, I end up posting a video lecture. I go sit in class in case anyone wants to come and talk about anything." Ben also found that using video to explain a complicated topic or an assignment

allowed him to use class time for other items and helped him to clearly articulate information to students.

> [I use video] for a complicated problem that I can do or assignment instructions like the case study. I have realized that the 15 or 20 minutes of class time to describe the case study in detail, I could use the class time for something else. And, you know, I end up repeating myself in my office seven more times for the people that weren't there individually. A video totally takes that problem away. So, the video allows me to very deliberately say the things I need to in the way that I need to so that they get the guidance for the case. So that would probably be the biggest technology use for me, video-making software. What I mean by that is screen capture software and voice. (Ben)

Ben approached his videos informally and usually did not script them unless he was doing a more complicated animation. He tried to keep the length of videos between two and twelve minutes because he did not think students would want to watch longer video clips.

Brad used screen capture software to create video to incorporate into a blended classroom delivery model. Brad had previously "used video for students to review the concepts presented in class … but thought, why not give the video to students first and create a blended class." Although it took Brad time to create the initial video, they could be re-used, which he stated saved time during subsequent offerings of the same course. He created three components to his course and the first component was a video lecture students watched outside of the classroom. The video lecture typically consisted of "narration over a PowerPoint presentation." This video could replace, for example, a Monday class. The other components of the course included a class discussion of concepts, which could occur on

Wednesday, and then a class activity on the Friday class. The videos were available to students as a full 50-minute lecture and also as shorter clips so students could choose whether they wanted to watch the lecture material in one chunk or not. Brad questioned whether students understood the concepts as well as when he lectured in person. He wondered if that was because students could ask questions right away during an in-person lecture. "Based on the class discussion of concepts in the video, I'm not sure [students] have the same understanding as when I was giving the lectures in person." However, Brad was not sure why there seemed to be a gap in understanding since students indicated they like the video. Findings related to discussions are included in the following chapter.

Harmony created one narrated digital presentation, which was provided to students as a video, as part of a research project to present difficult concepts to students. Students watched the video and participated in an online discussion, which will be discussed in chapter five, instead of coming to one class. The digital presentation included text with embedded video and images. She was unfamiliar with the technology and "had someone help [her] because it was not [her] expertise." Harmony saw her role as interpreting articles to give students foundational knowledge that can be drawn upon for discussion in class. She also saw the benefit for some students who might want to re-watch some of the material.

> It allows individuals who may need to have that slide repeated a few times, they had the opportunity to do that. So, in some ways it was a self-paced flipped classroom. So it wasn't just "do your homework, answer these questions and come to class" I was still interpreting [concepts] and for me that was important. When I look back, when I first started teaching 18 years ago to now, we do have more students who identify as English as a second language or students who have learning disabilities. So I think

> that having that opportunity to have a self-pace is appropriate in terms of trying to foster student success. (Harmony)

Although 75% of the students indicated they like watching narrated digital presentations as a way of learning, "they did say they wouldn't want it for every single class." Harmony stated, "as an educator you have to kind of mix it up" to provide some variety and recognize when a learning technology, such as a narrated digital presentation is "a good fit in terms of the concepts." Harmony also indicated that the technology was "only as good as [her] comfort level as well as [students'] comfort levels." Because the use of recorded video was part of a "Scholarship of Teaching and Learning research project," Harmony published the results.

Similar to Harmony, Brandon believed that video can be particularly beneficial to students who have English as an additional language. "International students who have a challenge with English can watch them again and again or stop them, reviewing for exams, preparation for the capstone." Brandon began captioning his videos to increase accessibility and allow students to see the words as well as hear them.

> I found out that, through Google, adding closed captioning with a text file is dead simple. Now my disadvantage is that I didn't start with a script, so I'll have to transcribe it…. And for international students [speed of speech] can be a problem and I probably use slang when I'm not aware of it. If I can have the words down there, it will help them that much more. (Brandon)

Brandon created video of screen captures and audio to provide demonstrations for students on how to use software required for the course. "I've done a ton of Excel video. They're typically five minutes or less and they usually cover one significant topic … how to do a projected increase or a percentage increase … and I just walk them through." Brandon did

not script the video but tried to keep them "tight and short because I don't think students want to wade through a half hour video." Brandon used a tracking feature in the LMS to determine whether students watched the video. "I turned on the tracking feature in [the LMS] so I know they've been used."

Hope used video to highlight difficult concepts within her online course, especially if the concepts might be challenging to understand through text. She also created narrated digital presentations to mimic how she might explain concepts in a face-to-face course.

> So, I know that I am a very visual learner and I think many people are really visual learners. So, some people can learn by reading. Many can't or find it more difficult to learn that way…. It's as close to being in a classroom, I think, as I've been able to find yet…. So, all the audio PowerPoint I have done have no text, or very little text … so they're quite visual. They are mostly images and you can hear me narrating … then I have the highlighter for certain things – it's a lime green colour that I've traced blood flow. (Hope)

Hope had also been involved in a video development project when her course was first created for online delivery. In these videos Hope gave short lectures and acted out content in the course to help students better understand abstract concepts. "This course is where we did video clips and [the producer] came over and videotaped me and we have inserted all of those video clips specific to different content."

Instructors also incorporated existing video or animations into their class presentations so students would receive presentation of concepts in different ways. Helen added video or animations to her digital presentations. Ben said students found his quantitative and problem-solving course challenging and he looked for ways to help students

who did not seem to have an aptitude for the concepts. “It’s quite bimodal in the way the grades turn out. There’s a group that gets it and a group that doesn’t get it… it’s a little bit challenging not to lose those that don’t have an aptitude for it.” Ben used video from YouTube to provide background knowledge or examples to students.

> There might be a concept that I need another example, these students have never been in a warehouse before so they’re not going to know what I mean. So, I might find something [online], a video clip, and show that … I use three or four things every class and try to get video in there as often as I can. (Ben)

Teacher’s Conception Through Synchronous Conferencing

An online synchronous conferencing system allows instructors and students to come together from various locations at the same time by logging into an online classroom. Hanson used a synchronous conferencing tool to deliver online lectures to students.

> I developed it into a hybrid model and most of the lectures are actually done online live through [the LMS] and then on [a synchronous system]. So, out of the term I have 80 percent of the classes done online by lecture. (Hanson)

Hanson felt it was important for the program in which he taught, as well as the university to be seen as progressive and utilizing technology. A synchronous online lecture was developed to provide flexibility to students. “We actually purposely schedule it on a Friday when there are no other classes and they essentially can stay home on a Friday and they can come to class in their pyjamas or what have you.” Hanson also found the online format convenient for him because “it was helpful with my role of expanding administrative duties … I’ve had a couple of times where I taught from [a different campus] and students have all been online.”

Although the course was offered online, Hanson delivered the synchronous session in a classroom so students could attend face-to-face if they preferred.

> If it's an online lecture, most of the time I'll go do it in the classroom and [students] can come in person and sit in the classroom and participate… and every year I get a handful, maybe three or four that choose that because they don't necessarily feel comfortable with the technology. (Hanson)

Although Hanson initially wondered if recording the synchronous lectures would decrease student attendance, he did not think recording sessions had affected attendance within the live synchronous sessions. He also noticed students were able to play back the recordings and "some of them [would] re-listen to the lectures before an exam."

> I would argue that attendance has not gone down and I've noticed, compared to some of my [colleagues] who teach live lectures in the classroom, that my attendance [in the synchronous session] is actually better than with some of the traditional delivery methods for the same group of students. (Hanson)

Hanson ensured students were prepared to attend an online synchronous conferencing session by providing an orientation at the beginning of class. A combination of providing an orientation, improvements in technology, and access to technology support have resulted in few technical issues for students.

> The first class or two is always in person and then I discuss the delivery format … I send [students] an email [saying] "you may want to think about what devices and tools you have" … headset and those pieces and when we get to class I discuss how it works. I show them an example of how to get into [a synchronous session]. I'll leave a version of an online class open for the first few weeks and they can go in and test

> their equipment…. [Technical problems] have been pretty minimal surprisingly. The first couple of years there were one or two [students] who seemed to struggle when they first tried to get on … and also they have access to IT and they'll help [students] out. (Hanson)

Hanson believed the synchronous sessions worked well because students knew each other from other courses. Because there was a "community of learners," Hanson did not think students would feel isolated.

> They have become a very tight knit group. There's only 30ish of them, or less some years, and they really get to know each other…. so this notion of creating a community of learners you know, they're not just feeling isolated. (Hanson)

Teacher's Conception Through the Learning Management System

All instructors in my study used the LMS and this section describes how instructors used the LMS to support the presentation of concepts. The LMS was viewed as a one-stop-shop for both instructors and students. Brandon explained, "all the links are in the [LMS] course." Brandon and Bjorn described the benefit of accessing the publisher resources directly through the LMS. "Students don't like, and I don't like it myself, remembering five different logons and different locations. But with this, you have everything integrated within [the LMS] … just click and go right into [the publisher resources]" (Bjorn).

Halina used the LMS to disseminate information that students required in the worksite placement.

> There's also a lot of reading they need to do. I have different files, one for reading, one for bringing with them [to the worksite placement] … resources, things like AHS

> resources, documentation, communication, professional behaviour, CPR, assisting a code blue situation… a pain ladder, how to assess someone properly for pain (Halina)

Halina stated the LMS was not only a one-stop-shop for students, but also a place where instructors shared resources with each other. Although she would have liked the LMS to be more intuitive to use the tools or features, she relied on the LMS to access materials from colleagues. "I think [the LMS] should be more user friendly, but I couldn't do without it. Because, for the instructors, we borrow each other's files. And if you go into [the LMS], we all have the same things."

Haley echoed that the LMS was a "one-stop-shop" where all components of "theory and lab are tied together" for students and where materials were posted for instructors. "We have a [simulation] site but there are no students in there, it's just for instructors' development. Everything they need is right there."

Ben did not feel the current LMS provided many new features or opportunities for teaching and learning over previous versions. "[The LMS] 13 years ago was quite similar. I don't think the new [LMS] does a lot … even 13 years ago I could post announcements and things". Bjorn and Bill acknowledged that they had not learned the features of the new LMS or struggled when previous features or tools had changed.

> So, it took me a little while to figure out the reorganization of [the LMS]. I felt we gained a lot of features and we lost a few features. For the first little while, all I really did was post content. (Bill)

Instructors used the LMS for two main activities related to teacher's conception, to (a) disseminate information or post content and (b) organize course materials to help students think about the course concepts.

Dissemination of information. Instructors used the LMS to share information with students. Haley described the LMS as where students went to get learning materials they were required to complete before a simulation event. "So most of the courses for the integrated simulations use [the LMS]. So on [the LMS] students would be directed to their prep for sim." Bill, Helen, and Hope used the LMS to share web links or articles to provide additional information about course concepts.

> The web links to me are very important and I think they are easy to use. I would set up a content folder for a topic, usually a couple of web links and any PDF articles. I would add those separately. (Bill)

Instructors posted their digital presentations or other documents in the LMS for students to access. Bjorn found having one area from which students could access materials ensured information was easily found by students. "Everyone knows that this is the one-stop location … never any issues related to lost documents … no paper copies to keep track of." Bjorn also discussed the benefit of posting digital copies for students to decrease printing.

> I'm a bit of a tree hugger, so my policy is not to copy a lot of paper, so I put of the things in [the LMS]. If the students themselves want to print it out, they can. But that way they can access it no matter where they are. (Bjorn)

Hanson uploaded handouts and digital presentations for students to access during the synchronous conferencing session. Handouts included diagrams and "skeleton notes that are really just like basic headings and [students] can fill in the depth as they see fit." When Hanson first began offering synchronous sessions, he considered how to best format and distribute materials. He also reconciled concerns he had about digital copies of his notes being distributed to students.

> In traditional lectures it would be easy to hand out a hard paper copy of things. We're moving, in our program, to paperless as a possible initiative, and sustainability. But that aside, I still had to think about how I would get handouts related to the lecture I want [students] to have, what format are they in. So, I had to spend some time adjusting what I would traditionally give as [paper] handouts, whether it is Word format or PDF or different things and how I uploaded them [to the LMS] and distributed them to the students. I also had to get past the notion and the fact that we struggle with being quite protective of our documents and getting to the level of being open with digital versions being out there for students to access all the time. (Hanson)

In teaching an online course, Hope used the LMS as a way to distribute course information to students. "They have the content that's loaded on [the LMS] as a PDF. The content was written by experts in the field and then has been edited … then I provide instructions about where to start and how to tackle the content." Online or web resources and video from the library were also linked from within the online course. Hope provided her own notes for each module to highlight pieces that she felt were more or less important for students to focus on.

> I've gone through each module and made my own notes and so I highlight that for them. So, I'll say, read [the modules], but here's my summary notes and I highlight things that are important and I also highlight things that, in my opinion, are less important.… Sometimes they want to read all the content and then my notes as a summary. Sometimes they read my summary as a steering point and then read the content and then sometimes come back to my notes. (Hope)

Bill used the announcement tool within the learning management system (LMS) to push information or reminders to students throughout the term. Before he began using the announcement tool, Bill used to remind students at the end of each class to prepare for the next class. He found announcements, which students could see on their phones to be more effective in motivating them to complete the activities required to be prepared for in-class learning. Bill explained,

> I can say, you need to read chapter three for tomorrow, but if there is an announcement going out this afternoon saying "after you've read chapter three, make sure you know," and I'll put a couple of points in there. So, I find that students come to class prepared because there is a reminder that pops up on their phone and that's how they seem to be doing things. So, I don't think I could do the same thing by, you know, I finish my lesson and write it on the board, make sure you read chapter three and make sure you know this … [students might say] yah, yah, yah and head off to the next class. But those messages seem to be fantastic. (Bill)

Organizing course materials. Hope also used the LMS as a way to organize online course materials for students. Hope modified the standard or default layout of the LMS and organized the tools students would need.

> I like when [students] go into [the online course], not to go to the dashboard. I like them to go to the course content page. On the left will be buttons for their course schedule, course outline, and the course content … and there's a communication section, so this course would have a discussion board and email tool so they can email each other and me if they wish. Announcements is always on there and then there's always a help section and also somewhere I have a piece about web resources. (Hope)

Hope guided students through the online material to ensure they knew how to progress through the online course content. “It’s very logical. It’s module 1, 2, 3, 4 – but I also give them some instructions about what pieces to start at…. I steer them a lot.”

Bjorn organized materials for students by building the course within the LMS as the semester progressed. By putting material up when students needed it, students were better able to find documents and resources.

> Usually there is a basic document that I have [in the LMS] when students come to class on the first day. That will be the syllabus, that will be the textbook [PowerPoint] slides. I will gradually build up [the course] as we progress through the semester because I find if you have too much stuff, like a big forest, you can get lost. But instead, after every class I upload my PowerPoint slides, or if we talk about a specific item then after that I would upload the documents we saw today. By the end of the semester I would have a fairly rich [course] with different folders, you know, examples that they can solve at home, recommended textbook problems, reliability tables, formula sheets, my full set of slides, and sometimes I would have links to videos and [resources] for self-study. (Bjorn)

Bill also built up course content in the LMS as the course progressed and organized materials for students to help them to think about concepts in a different way. He grappled with how the features or tools in the LMS aligned with his way of teaching and what he expected of students in their learning.

> I would set up a content folder for a topic, usually a couple of web links and any PDFs…. I’ve kind of stopped at the idea of what a module is compared to just a content folder because I don’t really want my students thinking sequentially…. As the

> lessons move on, more and more things appear…. I don't think students should be learning sequentially, I think they should have the freedom to discover. Some students don't like that. I've had some students come up to me and say that they really don't like my method because they just want to know what they have to do today … I'm trying to get them to think. (Bill)

Bill remembered his own experiences as a student and how progressing through a course sequentially resulted in him missing the interrelationship among concepts.

> One of my online courses… that's where this came from for me – and one of my online courses was so sequential I missed the point of the interrelationship of the content. So I challenged the prof on that and said, this isn't working for me, I need to know the interrelationships…. But I try really hard to connect the dots. (Bill)

Summary of Findings

Instructors who participated in my study used a variety of strategies to present concepts and provide explanations to students. The following list summarizes the main findings in this chapter.

1. All instructors except Hope, who was teaching an online course, incorporated face-to-face, verbal explanations into their courses to explain concepts to students. Brent, Brandon, Bill, and Brad emphasized short lectures followed by active learning tasks. They believed a combination of verbal presentation and active learning was required for students to understand course concepts.
2. All instructors considered ways for students to gain background knowledge or to prepare for class. Bill showed a video clip or told a story to ensure students knew the objective or what the topic was about. Hanson and Helen started class with an article,

news item, or review to help students think about concepts and create interest in the content.

3. Instructors indicated some concepts within their courses may be more challenging to students to understand. Helen presented explanations in different ways such as using a case study, animation, or drawing to provide variety and because not all students understood in the same way. Ben did not provide mathematical proofs for complex topics in his class to prevent students from becoming overwhelmed. Harmony used a holistic approach to her class and had students begin by thinking about their professional identity before presenting the knowledge and application components. Harmony believed developing a professional identity provided context to knowledge and skills.
4. Instructors guided student learning by providing students with information on how they might approach the discipline (Hanson, Helen), using announcements to remind students to complete readings before the next class (Bill), and providing learning objectives to help students frame their learning (Ben, Brent, Bjorn, Bill, Brad, Halina, Haley, Harmony, Hanson, Hope, and Helen).
5. All instructors except Brandon used textbooks or journal articles as a way to explain concepts to students and provide background information. Helen and Bjorn described the rich publisher resources such as video, animations, and questions and answers that were available to students. In addition to providing background information, the video and animations allowed students to see concepts explained in ways that were different from Helen and Bjorn's explanations.

6. Instructors used digital presentations to supplement their explanations to students. Digital presentations were used as a way to distill content down to basic concepts for students (Bjorn, Hanson), organize material for both the instructor and students (Harmony), and provide graphics, video, or animations (Helen, Bill).
7. Five instructors, Hope, Harmony, Ben, Brandon, and Brad, created narrated digital presentations that were saved as video to explain concepts to students. In addition to presenting course concepts, Ben used video to explain course assignments to students. The instructors in the study stated there was a benefit to students in being able to stop, rewind, and look up information as they watched the presentation. Brandon and Harmony indicated that students with English as an additional language may benefit from controlling the pace of a presentation.
8. Two instructors, Ben and Brandon, used screen capture programs to provide demonstrations of how to use software and how to complete functions or mathematical calculations.
9. One instructor, Hanson, used a online synchronous conferencing tool. He stated providing his Friday class online provided flexibility for students. Hanson conducted most of his classes within the classroom so that students had a choice of attending online or in person.
10. The LMS was used by all instructors and was used as a one-stop-shop for both instructors and students. The LMS was used as a way to disseminate information to students and as a way to organize, or think about, the course materials. Ben, Bjorn, and Bill did not feel the new LMS had many new features over the previous LMS.

Bjorn and Bill acknowledged there are some functions they are unable to do in the new LMS.

Chapter Summary

Using Laurillard's Conversational Framework provides a way to examine the strategies instructors in my study used to present concepts to students. Laurillard (2013) described what the teacher must do to ensure there is ongoing and accessible dialogue between the teacher and student. Helen, Hanson, and Bill used bridging activities at the beginning of class to help students engage with the course concepts. Bill sent reminders to ensure students completed readings and were prepared for class discussions. Hanson created skeleton notes so students could participate in discussion rather than feel they had to write everything down. Explaining phenomena, clarifying structure, providing representation, and giving descriptions are some of the roles or strategies that instructors drew upon. The findings presented in this chapter suggest instructors used verbal presentation and a variety of learning technologies to support the way they presented or explained complex course concepts to students. Digital presentation tools were used to help organize lecture material as well as to provide information to students in different ways. Narrated presentations allowed students to view materials outside of class time. The LMS was seen as a one-stop shop for both instructors and students.

However, examining the use of learning technologies from the perspective of teacher's conception does not include other requirements for learning in a post-secondary environment. Strategies to help students clarify and articulate their understandings to others as well as practice tasks designed to help students form a conceptual understanding are presented in subsequent chapters.

Chapter Five: Students Conceptions

Laurillard (2009) described the need for teachers to check that students have understood concepts and, if needed, for teachers to re-explain and clarify concepts. The teacher guides learning so students have the ability to ask questions, articulate their ideas, and engage in discussion. This chapter addresses the sub-questions, *how do instructors check students' understandings of course concepts? and what opportunities are provided for students to discuss concepts with classmates?* Asking instructors questions about their actions led to conversations around instructors' teaching conceptions and why they chose instructional strategies and learning technologies. Sub-themes within the chapter include (a) questions from students, (b) muddiest point, (c) discussions, (d) quizzes, (e) examinations, and (e) safe learning situations.

Questions From Students

Instructors in the study believed students should ask questions if they were unclear about a particular concept and instructors should be available to answer questions. "I rely on [students] to ask questions" (Ben). Helen stated, "I do rely, I suppose, somewhat on their own ability to tell me whether or not they are having difficulty."

Instructors indicated students asked questions in class, by email, and during office hours; however, the majority of students used email. "More emails than anything else now. A little bit of office hours, but this last term was email. Lots of email questions" (Ben). Brent noticed students who were quieter in class tended to send email to ask questions. Additionally, students expected a quick response to their email messages.

> I find that the students who are quieter in class, may not be willing to put up their hand, email me. And these days, everyone seems to want an instant response. It may

> be Sunday night at midnight and [they wonder] how come they couldn't get ahold of me. (Brent)

When students had questions about solving problems, Bjorn sometimes found it difficult to clarify concepts by email.

> So, students would, for instance, sit at home solving some problem and get stuck on some particular thing. In email it's tricky because you can't really write a long explanation exactly. So, I would say, "ok, you have to think about this and you'll find that in my slides from this day" and give them some hints. (Bjorn)

Hope used the questions from students to give her feedback on how they were approaching her online course and further guidance she might need to provide.

> I'll have emails from students about questions within the really in-depth piece of content ... I'm then making an assumption that "you're reading that content first as opposed to my notes first". Because if they had read my notes first they would have read a piece that you can ignore this section. (Hope)

Harmony found students who needed help with writing assignments preferred to ask questions during office hours. "I would say that students who struggle with writing will want [to meet] face-to-face. Some students will say, 'I'm pretty sure I'm on the right track, can you just quickly look at it.' I think they just want some reassurance" (Harmony). Brent found students who needed help with mathematical calculations also tended to visit during office hours. "Except for my quantitative courses, where I have to explain a calculation to a student, students don't come to office hours anymore" (Brent).

Helen found when students were unsure they understood a concept, they would explain it to her verbally so, as the instructor, she could clarify any misunderstandings they

had. However, she noted students would not ask questions if they thought they understood course material.

> If someone is unsure about their understanding [of a concept] then they usually try to articulate [their understanding]. They'll say, well this does this and that. And I'll say, well actually, because of this it's really this. Or I'll affirm that they've got it correct. (Helen)

Helen indicated most of her students came directly from high school and needed reassurance they understood the course concepts. However, occasionally she had students with degrees, who were changing careers, and who were more prepared as to what was required to be successful. To help students articulate their questions, Helen asked students whether they had questions and if they understood the concepts. "I do repeated checks during class time – to just say, ok, does that make sense – is anyone having trouble with that concept – try to get affirmation while I'm explaining it" (Helen).

Bjorn noted not all students participated in class discussions; however, even if only some students asked questions in class, he felt others benefited.

> It's the same students, often, that ask questions in class. In a way I see it as a service to other students because the other students would like to ask that question, but they don't unfortunately. If the students ask a question, I know that the other ones are thinking the same thing. (Bjorn)

Bill helped students think about the information they required to approach assignments and the types of questions students might want to ask. Instead of providing detailed information on an assignment, Bill gave "bare bones" information and encouraged students to ask questions. He did this to "engage students" and because he thought "if they're

asking questions and getting answers, I mean that's my belief, I should probably do some research to test that out, I think they get a better understanding of the assignment" (Bill).

> I said to the students, you know, I could go over the assignment for about half an hour, but I'll just give you an idea of what the assignment is about and then I'll be open to questions. So the assignment is about developing your life. Any questions? And it was perfectly silent. I said, come on, there has to be questions. How much is it worth? Ten percent. How many pages? It can be between five and seven pages. And the students asked all the right questions. (Bill)

Bill also set up a discussion board in the LMS that he called FAQs (frequently asked questions). Many of the email questions he received from students were process type questions such as "when is the assignment due." Setting up an FAQ area provided a place for students to check for answers to commonly asked questions. Although answers to process or administrative questions may not directly relate to course concepts, when students understand expectations, they may be better able to focus on concepts within the course.

> If students have a question, they can post in [the discussion board] and I'll respond to them. But I say to students, if you have a question about an assignment, look in the FAQs and if it's not there, post it and I'll respond to it. (Bill)

Hope also created a discussion board for students to ask questions and found, in her last class, students answered each other's questions. However, some students seemed to be reluctant to post questions on the discussion board and would email her individually. If Hope thought the question and answer would benefit other students, she would post the question in the discussion area without including the student's name.

> There's a discussion forum that says "please post any questions" so if people are comfortable, I encourage them to go to the discussion board. But some are too embarrassed or too nervous, I think, about being judged in front of their peers, so they'll send me a private email. And then, what I often do is post. I'll leave them anonymous, but I'll start a discussion thread just to clarify the content. (Hope)

Hope answered questions because otherwise students "can go off on a wrong track or misunderstand … typically I'll say yes this is correct and then I rephrase it in a different way to emphasize."

Hanson used tools within the synchronous conferencing system to check students' understanding of concepts. When asking students whether they understood a concept, he was able to check whether students gave a "thumbs up" by clicking on an icon. He could see "who [had] responded and sometimes [he'd] catch that nobody [had]." He then discussed the concepts with students again, asking questions to capture student thinking. A text-based chat window allowed students to post questions during the synchronous session. Although Hanson would stop and review questions, he noticed students would also answer each other's questions, thus allowing students to articulate and share their conceptions with classmates.

> The other thing that I found really valuable on the [synchronous conferencing system] was the live chat window. I encourage that … and students will post their questions. Sometimes I'll pause and answer [the questions] or I'll ask the rest of the class to help answer. Other times you'll see the students answering their own questions in a sidebar chat. (Hanson)

Hanson thought the text chat window provided a place for students to ask questions if they did not feel comfortable asking questions verbally.

> Some students are more comfortable talking and getting on their mic and asking questions … but it's probably no different than a traditional classroom where some are more comfortable sticking their hand up than others are. I think the sidebar chat window has actually freed up some of those that are a little more insecure about, you know, sticking their hand up, so to speak. I firmly believe that there are some who normally wouldn't participate in class but they feel more comfortable adding the comment in the side window or asking a question in the side window because they just type it in. (Hanson)

Halina's students used their cell phones in their worksite placement to contact Halina if they had questions or needed assistance.

> All of our students carry cell phones with them for communication. Also, sometimes we need to look up something really quick and we're not by a computer. So this is a tool that I use … if students don't have access and need a quick refresher, I usually open this app. (Halina)

Muddiest Point

When asked how they checked students' understanding of a concept, three instructors, Hanson, Ben, and Brad, responded they made use of muddiest point activities (Angelo & Cross, 1993). Students were asked to write down the concept that was most confusing or that they did not understand. Ben and Brad provided classroom time for students to complete a muddiest point activity. Ben also asked students to include the topic or concept they believed they understood clearly. "Once or twice a term I'll pass out a clearest point – muddiest point sheet" (Ben). Hanson created a muddiest point discussion board in the LMS that was available throughout the term. He allowed students to post anonymously, so

their names would not be displayed beside the questions they asked. He also encouraged students to answer each other's questions.

> I set up a discussion board on [the LMS] and I call it muddiest point. The students can come on there and ask questions. I really encourage them to post, even if it's anonymously … they can post their questions or there might be a certain process where they write "I don't get that." And I've seen them post questions like "what does it mean when you said this?" Some years you'll see good student participation with [students] responding to each other. (Hanson)

Discussions

All instructors used discussion activities that required students to articulate their understanding of a concept and allowed the instructor to clarify any misunderstandings as needed. Discursive discussions allowed students to hear their classmates' perspectives and to learn from their classmates' understandings of concepts. Discussions occurred in a face-to-face classroom setting and online.

Classroom Discussions

Helen developed case studies as a way to question students and guide a classroom discussion. Helen explained that using case studies helped students develop a way of thinking as practicing professions.

> I think because it is a way of thinking that they have to develop as practitioners. They have to apply their learning in this same fashion in the real world, so it's a good way for them to start learning how to apply it. Because sometimes they learn facts, but they have to know what to do with the facts. A case forces them to consider all the

> potential options and potential outcomes and potential solutions for the problems a client might have. (Helen)

Harmony also used case studies to facilitate discussion among her students.

> It was after another discussion at a nursing conference … saying we don't have enough ethical concepts, not enough end-of-live. So that's when we decided – ok, this is an opportunity to create some case studies, and some peer-to-peer learning, richer learning and meaningful dialogue. (Harmony)

Harmony indicated in-class discussions helped students, not only to learn from their classmates, but also to learn how to evaluate the strength of their classmates' arguments.

> Most students come to class being open to hear other's ideas because they don't have all the answers. I think peer learning is a really good way to learn. And I think [students] are a pretty good judge, in terms of saying, "you know, she has quoted a couple of articles and she seems to understand what the perspective is and offers some new recommendations" … so I think students have good judgment of the knowledge that is shared. (Harmony)

Bill included activities where students shared ideas with a classmate, as a group, or through a poll. He used these activities so students were engaged during class and could articulate and share ideas and understandings.

> I try to engage [students] … so a common one would be think-pair-share. Or it might be that they have to work in a group and come to consensus or something. I would say half of the course includes some kind of an activity that includes technology. So it might be a poll through survey monkey or it could be a discussion we're having. Even if we're all in the classroom, it can be online. (Bill)

Brent used class discussions to help students prepare for their simulation assignment. He found active learning activities helped students work to understand the concepts and allowed him to identify when students might have misunderstandings.

> We do a lot of active learning and it's, for the most part, group based. So I would, for instance, talk about a particular concept and give them an exercise or case study. As a group, or groups, they think about how to solve the case study. We have a discussion in class, at which point I can start to pick up where people are going off track, or whether they're on track or not. (Brent)

Ben asked questions of students to guide them through the theory and problem-solving.

> We go over the theory and some problems in class… I would ask, what if a company did this, how would it affect our decision? Or I say what if our demand followed this perfect, alternating pattern – how would that look in our results where somebody would have to understand the underlying things. We do that in class. In assignments or exams, problems that require the same thinking will show up. (Ben)

Online Discussions

Bill created asynchronous online discussion activities in which students would participate outside of class. However, before asking students to complete an online discussion activity, Bill had students complete a practice activity in class. He did this to ensure students would know how to participate, both in terms of using the technology and what they were expected to post.

> I do a practice online activity. I'm not convinced that students actually know what to do in an online activity. So, for each of the activities we'll model it in the classroom.

> And then right away, the next class, they get to do it again without being in the classroom. (Bill)

Bill further explained what the activity and practice within the classroom might look like.

> I might present a conversation and say that there are two sides to this issue. So, if this was an online class, we'd be using [the LMS]. And what I want you to do is participate. I would talk about how they would need to participate. You're going to add discussion posts that have meaning, not just yes, I agree or no, I don't agree. I try to divide them up into groups so they don't [have a lot of] posts… so they might be in a group of five that has a specific topic. Then they would practice and I would go and compliment them and say, this is a really good post. This one, you need to re-post and I would ask them to re-post so that we can see good examples. (Bill)

In her online course, Hope relied on asynchronous online discussions to encourage sharing among students. She asked students to post their answers to case study assignments on the discussion board so they could see what others posted and provide feedback or comments. Students chose one of four case studies to submit as an assignment and then read and commented on their classmates' postings.

> They can read through each one and see which one resonates for them or they want to learn more about … I encourage them [to choose the one] they are most uncomfortable with so that they'll learn about more about that content. And so, by answering the case study questions I can get a pretty good feel of where their knowledge level is at. Those are actually posted on [the LMS] as case studies assignments [and] they can pick one of four. Part of the marks that are allocated is to

> read their classmates' case studies and then comment so that they get the value from all four without having to do all four. (Hope)

Hope provided a marking guide so students would know what was expected.

> Part of that process has been me encouraging [students] that their marks are not so much based on content so much as process … do they read other people's [case studies] and comment on those, to get away from the fear of being judged for not including something. (Hope)

Hope also modelled the type of comments she expected from students.

> I like that word netiquette, of being constructive and supportive and also in the role modeling I guess. These are examples of kinds of feedback you would give. That was really well done, these are the pieces that I like the most, these are the pieces that were missing. (Hope)

Hope found some students "dove in right away and posted" their case study assignments and then "everyone else would follow." As the course progressed, the same students seemed to post first, "but the other [students] would follow them more quickly" and Hope wondered whether students became more comfortable posting online discussions. Hope stated that online discussions worked well to help students see classmates' perspectives and ideas.

> So, you know, student A submits and students B and C make comments. And student A will often come back in and say, "thank-you, I hadn't thought of that" or "thank-you for adding that." Actually, these last couple of groups have gone very well with a lot of really supportive dialogue. And then they would branch off sometimes, you know, "at my [work] setting we did this. What's the practice for everybody else?" It was quite good. (Hope)

Brad created questions for students to answer in an asynchronous discussion within the LMS to articulate their understandings after watching a video presentation. He found that, although students participated in online discussions throughout the course, the quality of their posting decreased. "[Students] did not seem to put as much thought or effort into later postings" (Brad). Helen incorporated asynchronous discussion forums in the LMS to help students articulate understandings and for her to clarify misunderstandings. Through a survey she sent to students, she found students did not find them beneficial to their learning.

> In the past I have used question and answers using the forums on [the LMS]. But, every year I give an evaluation about the use of technology in my class and I take that feedback and make changes. Because this class is just so heavy, some of the students do find it burdensome to have to go and answer questions on [the LMS]. So, I've made some things more optional over the years. (Helen)

Harmony set up asynchronous online discussions where she would "post a question and [students] would answer … then they [had] to reply to two or three people." She used online discussions to ensure students who were not comfortable talking in class had a place to participate and for topics students may need more time to construct responses than is usually available in a face-to-face discussion. Harmony also believed that some topics that "might be a little more emotionally charged … like assisted dying," tended to work better online because students focused on "cited content."

> Because sometimes I think there isn't that room in a class to be able to [dialogue] or there is that fear of speaking in class … they might be very quiet or they need more time to be intentional with their opinions. So this gives them another venue to be able to have dialogue with a peer that they may not have had in class. (Harmony)

Quizzes

Ben used a student response system to deliver quizzes and check whether students understand concepts. However, the logistics of bringing the devices to class and ensuring batteries were charged became cumbersome.

> Once a term, or maybe two or three times a term, I'll use [a student response system]. It's gotten kind of cumbersome with battery issues. I put up questions with a, b, c and d would be "hey instructor, I don't know what's going on at all." But I use it less than I used to. (Ben)

If Ben noticed students had not understood a particular concept, he would "create a new problem that [he would] solve at the beginning of the next class." Although he realized the benefit of spending more time on a concept students might be having difficulty with, he stated, "we can't slow down on everything" (Ben). Ben wondered if he did not use a student response system more frequently because he was worried he would not have time to re-explain some concepts. "So may-be that's why I don't use it because I don't want to hear it because we can't slow down on everything" (Ben).

Halina verbally questioned students individually before they performed in a worksite setting to ensure students had adequately prepared and would be able to provide safe client care. Students needed the knowledge before they engaged in a practice task.

> For example, one of the requirements is that they have to research all the medications on a client…. I will quiz them on what the medications are, mechanism of action, [professional] considerations, and that sort of thing. So, then I know that they've done their research. (Halina)

Halina stated one of the instructor's roles was to stop students before they acted incorrectly, especially if client safety was at risk, and provide feedback. "I give feedback all the time" (Halina).

Haley used quizzes delivered through [the LMS] to help students check their understanding of the content before they went to a simulation event.

> They'll do a little knowledge test and that just helps to solidify their understanding of the concepts…. There may be a little prep quiz to say, "I'm good on the knowledge" or "I didn't do so well on that quiz and there are a few things that I need to learn before I go into [the simulation event]". And those quizzes are on [the LMS]. (Haley)

Ben, Brent, Bjorn, and Brad used the LMS to deliver publisher quizzes with multiple-choice questions as a way for students to check their knowledge of the material within the textbook. "Publisher [quizzes] would be lower cognitive skill testing, recall, hunt, and seek in the textbook" (Ben). Ben also created quizzes with more difficult questions. Using the LMS to deliver quizzes "reduced the marking," allowed students to take the quiz multiple times, and provided an option for him to put in generic feedback explaining the answer for all students. Brent felt the purpose of using quizzes was to ensure students had read the textbook and had the information they would be required to complete future application activities.

> They aren't terribly difficult. They are ten questions and they get 20 minutes and two opportunities to do them. Really, it's, "have you read the textbook" more than anything. I guess the reason that I want to do that is because, when they get into the application, they'll need to understand different things about strategy, different types of strategy. Students that ignore the textbook and ignore the theory tend to struggle in the application. (Brent)

Brent further explained students received feedback as to whether answers were right or wrong immediately and then got all the correct answers after the assignment deadline had passed. “They know they’ve got [the questions] wrong and can do [the quiz] again. And once the assignment deadline has passed, the answers become available to students” (Brent). However, Brent was not sure how many students checked the answers once they were available.

Bill used an online quiz tool to help students learn terminology for his course. Students created definitions for terminology on a shared document that Bill entered into an online quiz tool. Bill stated students liked creating the terms and definitions as well as using the online tool. “They’ve just eaten this up” (Bill).

Helen included questions and answers within her digital presentations. These were used either in-class to assess student understanding or for students to review on their own. “Each topic area that we cover I have questions and answers on the slides. So those are available for students. Sometimes we discuss them in class, sometimes they can independently work through them” (Helen).

Examinations

Hanson, Hope, Helen, Ben, Bjorn, Bill, Brad used examinations to assess students’ understanding of concepts within the course. Hanson helped students understand how they would be assessed on course concepts by providing examples of the types of questions that students should be able to answer. “It is an exam-based course. There are no other assignments … I will run through some examples of what questions could look like on an exam” (Hanson). Helen also provided examples of exam questions. “I do also provide for

them sample exam questions. So questions worded in a way that is similar to what they would see on an exam" (Helen).

Hope used case study discussions and feedback to help students prepare for the examinations. If requested by a student, Hope also reviewed midterm examinations to look for trends and provide feedback. Hope drew from her own experience as a student. "I had a professor that would say, 'go back and read' and that was not helpful. So I'll actually point out where their mistakes were" (Hope). If students indicated they did not understand what a question was asking, Hope might pull the question or rewrite it for a future offering of the course. "When they say 'I really didn't understand this question and the wording of this,' if it's a poorly worded question, I'll just pull it. Other times I'll just make note of it and revise it for the future" (Hope).

Ben allowed students to use formula sheets for the midterm examination so students could focus on correct application of the formula rather than memorization. The final examination was "held in the lab and [was] open book" so students had access to software and data files that were required to complete the examination. "And they would download a data file that a few only, most of these questions is a normal exam, and a few questions with excel and they would upload [to the LMS] that to support their answers" (Ben). Bjorn created examinations that included both multiple-choice and short answer questions in order to balance his ability to check students' understanding of concepts and the time required to mark examinations. The examinations were structured according to Bloom's taxonomy, starting with general knowledge questions and moving students up to application. This structure also helped Bjorn to mark examinations more quickly because he was able to see where students made an error in their approach to a problem. After examinations, Bjorn

reviewed typical mistakes with students to clarify concepts that "will come back in the next exam[ination]" (Bjorn).

Safe Learning Situations

Helen stated creating a welcoming, safe environment is necessary to ensure students feel comfortable asking questions so instructors can, in turn, monitor students' understanding of course concepts. "I think that whole feeling of a safe space helps people who are maybe having some difficulty to feel ok to ask a question and not feel like they're stupid … I get a lot of sharing in my class as well … it generates lots of good discussion." Helen's welcome letter included "words of welcome so that [students could] hopefully feel safe when they [came] to the classroom." Bjorn also acknowledged the need to create an environment where students could ask questions and clarify understanding.

> I think that's what I'm really striving for, to create a climate in class where [students] feel comfortable asking questions. It's not to show off or anything. So I spend a lot of time saying that the class is a co-creation. If you don't ask questions, then I'll assume that you know it. The understanding for all of us will be greater if you ask questions and we can have more of a, in a way, a conversation. (Bjorn)

Hope compared students in her undergraduate class with working professionals who were taking her online course. Whereas the undergraduate students appeared to be comfortable posting on an online discussion board, Hope felt she needed to do more to help working professionals feel safe when posting.

> Both groups have been very polite and very supportive. There's a certain level of comfort perhaps in the undergraduate students because, by fourth year, they've done it before… Whereas the [professionals] are not as comfortable with maybe going

> back to school for the first time or in a classroom and being judged by their peers. I needed to make that really explicit for them that it was a nonjudgmental, safe environment in which to post things and it was a process to learn from each other. (Hope)

Hope felt that the most important thing she could do to support student learning was providing support.

> Support, clarification, helping them to prioritize. Anybody can read whatever it is out there. The content in the course is well written … I think it's more the moral support and breaking it down into small pieces so it doesn't look so overwhelming. (Hope)

Halina worked to create a "safe environment" by specifically telling students to ask questions because "[they] will be learning until they retire." Halina recognized that sometimes students had personal issues that might affect their performance at the worksite placement. By showing respect to her students, she hoped students would in turn trust her and share their questions and uncertainties.

Harmony described her background in caring science and how she used her understanding of self to understand students. This understanding then created a safe learning environment for students.

> My background or research interest is about caring science, so it's really about being relational. So, I think it's understanding who I am, my strengths, the areas I need to work on and then understanding that the students come from varying perspectives … it's about fostering that relationship so that students respect the learning experience, they respect me, but I also have to create a safe learning experience and respect them. (Harmony)

Harmony recognized the power differential between her and her students and stated that developing mutual respect and an environment to question the concepts, could make her more vulnerable.

> It's about stepping out and being vulnerable as a teacher and recognizing that during my vulnerability, even though it's scary sometimes, it's a richer experience. Because they can feel comfortable saying "I don't know that" and, ok, neither do I so where are we going to go from here…. If I'm not vulnerable, I don't get that energy from the students and we don't get that energized classroom. (Harmony)

Similarly, Hanson created an environment for students to feel comfortable by telling them that he may not always have the answer, but will "look it up and get back to [students] next class." Being human and showing he had a sense of humour allowed students to "connect" to him and the class.

> Being open to discussions, open to questions, projecting that sense of, hey you're human and I'm human and I may not always answer your questions I mean I might have to come back to you. I think it's really important to students connect to that. You're not just the sage on the stage so to speak. And they, it's funny I'll tell them at the beginning I may not always get it but if you ask me a question, if I can look at it and get back to you next class, I'll let you know. And some of them will purposely within the live lecture they'll be online, they'll answer the question they'll say "oh by the way Hanson I looked it up on Google and this is what they are saying" and "ah yah you're right" like it's kind of neat to see that sort of interactivity with the social media so to speak … I think some of those are the key pieces you know being human

> letting them know having a sense of humour those sorts of pieces they seem to connect really well with too. (Hanson)

Summary of Findings

Instructors who participated in my study used a variety of strategies to check students' understandings of course concepts and provide opportunities for students to discuss concepts with classmates. The following list summarizes the main findings in this chapter.

1. Instructors believed students should ask questions when students were unclear about course concepts and that instructors should be available to answer students' questions (Helen, Ben, Brent). The majority of students asked questions through email, although some students asked questions in person, either during office hours or in class (Ben, Bjorn, Harmony). Instructors allowed students to choose different methods of asking questions depending on the type of question or students' comfort level (Brent, Bjorn, Harmony, Hanson).
2. Although instructors felt students had a responsibility to ask questions, instructors also used muddiest point activities to determine whether students understood concepts and clarify misconceptions.
3. Discussions were used to help students articulate their understandings (Helen, Bill, Hope), help instructors identify misconceptions (Helen, Brent, Hope), and allow students to hear classmates' perceptions (Harmony, Hope, Bill).
4. Bill incorporated technologies such as online polls because Bill felt students were more engaged when their data was used in discussions.

5. Harmony created an online discussion for topics that may require more time to construct responses and to allow a place for students who might not feel comfortable talking in class.
6. Some instructors provided guidance to students regarding what was expected in online discussions. Bill completed a practice online discussion activity with students in class because he did not think students knew what was expected in an online discussion. Hope created a marking guide and emphasized to students that marks were based on the process of discussion rather than the content of postings.
7. Instructors provided quizzes for students to check their understanding of concepts. Quizzes most frequently tested students' knowledge and were delivered through the LMS (Haley, Ben, Brent, Bjorn, Brad). Feedback to students included correct answers, students' responses and whether they was correct, and sometimes generic feedback explaining the answer. Ben used a student response system to deliver quizzes to check whether students understood concepts and to provide additional explanation if needed. Halina verbally questioned students to ensure they had prepared for a worksite placement and could provide safe care.
8. Instructors indicated examinations allowed them to check students' understanding of course concepts (Hanson, Hope, Helen, Ben, Bjorn, Bill, Brad). In addition to helping students prepare for examinations (Hanson, Hope), instructors provided feedback to clarify concepts for the next examination (Bjorn, Hope).
9. Instructors used terms such as active learning and engaging to describe learning activities that were designed to help students understand course concepts (Bill, Brent).

10. Instructors stated a safe learning environment was required for students to feel comfortable asking questions and participating in discussions (Helen, Harmony, Hope, Bjorn). Hanson and Harmony said instructor vulnerability helped to create a safe environment for student.

Chapter Summary

According to Laurillard (2009), discursive interaction between instructors and students is required for learning to occur in a post-secondary environment. Providing opportunities for students to ask and answer questions and to then receive clarification from the instructor helped to develop students' conceptual understandings. Instructors used face-to-face and online discussions as a place for students to ask questions, share perspectives, and clarify understandings. During an online synchronous session, Hanson's students used a chat window to ask and answer questions. As discussed in the previous chapter, presenting content without engaging students in an interaction may result in misconceptions. Students were encouraged to reflect upon and answer questions, which allowed the instructor to expand on explanations. Questions from students further allowed the instructors to gain insight about what students were thinking and where misconceptions may lie. Brent ensured students were "on track" before they started a simulation activity. Ben, Brad, and Hanson provided muddiest point activities and then gave additional explanations based on students' responses. Instructors in my study relied on students to ask questions; however, students may not realize they have misconceptions unless more formalized ways of examining their conceptions are available. Although Helen expected students to ask questions if they did not understand a course concept, she also created case study questions to help students articulate their understandings.

Articulating understandings and engaging in discussions supported discursive interactions among the instructor and students. The following chapter explores the experiential learning opportunities or practice tasks instructors created for students.

Chapter Six: Student's Conception as Practice

According to Laurillard (2009) the activities students complete in a practice environment align with the theory of constructionism (Papert, 1991). Students develop their conceptual understandings by working to achieve a goal that a teacher can use to evaluate the "level of understanding the learner has attained" (Laurillard, 2009, p. 12). The goal usually takes the form of a product, such as a research paper, group project, or presentation, where students have some flexibility in how they approach the goal. When students work together, collaboration involves dialogue and comparison of products to help clarify students' understandings of concepts. The teacher's role involves designing the practice environment in a way that aligns conceptual knowledge with application, which Scott (2001) differentiated between "know why" and "know how" (p. 348-349). As students develop their conceptual understandings through practice, they receive intrinsic feedback about what they need to do to achieve the goal. This contrasts with extrinsic feedback which may indicate to students whether their answers are right or wrong and may not tell them how they need to improve. This chapter will address the sub-questions, *how do students engage in practice tasks to develop understandings of course concepts? and what opportunities are provided for students to collaborate with classmates?* Sub-themes within the chapter are: (a) problem solving, (b) individual assignments, (c) group tasks, (d) laboratories, (e) simulations, and (e) worksite placements.

Problem-Solving

For the purpose of my study, problem-solving activities refer to activities enabling instructors to check students' understanding of concepts or allowing students to work on

problems or a task to check their own understanding. These activities often did not count towards students' final grades.

Ben, Brandon, and Bill asked students to work on problems during class time and circulated through the class to assess students' progress. Instructors checked students' understandings of concepts as they completed tasks, provided feedback, and identified whether there were common misunderstandings among students. Ben "walk[ed] around and saw how [students] were doing." Ben expected students to complete multiple practice problems to help them "understand the point behind [the problems] and to learn the concept."

Bjorn provided a list of recommended textbook problems for students to complete. After working through problems in class, Bjorn assigned similar problems for students to complete before the next class. At the beginning of the next class, Bjorn asked students to share their results and to describe any difficulties they had in solving the problem. Students' responses allowed him to provide feedback and clarify concepts.

> I have a list of recommended textbook problems … and I would solve [questions] a and b. And then [question] c is really the same example, they just use another level of significance. And I would say, for next class, why don't you do [question] c yourself and we'll talk about it next class…. Sometimes students will say that they got stuck and typically there are several students with the same issue and I can talk about that. (Bjorn)

Ben frequently used a "hand-out" at the beginning of a lesson or topic to introduce concepts to students. The hand-out provided a real-life problem that could be solved using the tools or formula; however, because students did not yet know the formula, they used

existing knowledge to solve the every-day problem. Ben used this strategy to provide context to the problems students would be expected to solve in the course.

> We'll do project management and in that chapter we'll learn to develop project schedules. But before we get into project schedules, there will be a handout and a simple context. [For example] laundry with three loads to wash and fold, if we start at this time, how long will it take to finish? It is a little harder than one might think to figure out exactly.… It's to try to build a little intuition around the context and then to follow up with formal theories and methodologies where they would understand why we are even doing something. They might think [the formula] is just a bunch of symbols, but if we do the laundry example first, and see the fundamental problem that needs to be solved, then the methodology for solving the problem is easier. (Ben)

Ben explained the handouts did not necessarily have correct answers, rather they were meant to stimulate discussion. Ben felt having students actively work on a real-world problem before a formula was presented was a better introduction to a concept than providing learning objectives. "After working on the handout, [students will] read the learning objectives and say, yes, I can see that" (Ben).

Bill walked around the class to ask questions and ensure students understood concepts for different activities or problems. " I ask questions about their diagrams or whatever they are working on. And I try to make it so that each [student] thinks I've checked in with them" (Bill).

Individual Assignments

Individual assignments refer to practice task activities students were expected to complete on their own, outside of class time. Halina created an assignment to help students

reflect on their worksite placement experience in relation to theory and professional standards within the discipline. By reflecting on their experiences and action, students were able to adapt and refine their conceptual understandings and discuss how they would approach similar situations in the future.

> [Students] have a number of professional standards and they need to compare something they observed in field placement, or their own actions to the standards. Then they have to reflect on what their response was and how they will go forward in the future. [Students] use scholarly articles that will back up their future goals … usually [students] learn the theory and then practice. This reflection paper is practice and then [students] look at the theory. (Halina)

Halina provided a grading rubric to ensure students knew what Halina "was looking for."

Harmony asked students to write a paper incorporating two theories. One of the theories was given to students and the second could be chosen by the students. Harmony liked to provide some choice in the papers but found "when I told them that they can write on anything … that panics them. They do like having more of a prescribed topic, I guess" (Harmony). Harmony offered to review the first paragraph of students' papers and provide feedback before students completed and submitted the assignment. "I tell them that I will read the first paragraph of their paper to make sure they are on the right track" (Harmony). She found about half of her students submitted the first paragraph for feedback. Harmony also had students read each other's assignments and provide feedback as a "peer review before they submit a paper." Using a rubric helped Harmony indicate how well students met particular criteria. She also provided feedback within the text of students' papers. "I provide feedback in their papers, you know 'you're off topic here, have you thought about this idea'

… I correct their APA citations" (Harmony). Despite spending time grading the assignment and providing feedback she thought would help students in future courses, Harmony heard from students that they don't always read the comments.

> Students will sometimes tell me that they toss their paper, and that's disheartening to me because it takes me probably an hour to read each paper … but some of them appreciate the feed-back. I continue to provide that because I think that's my responsibility as an educator to help students improve their ability to write. (Harmony)

Bill split assignments into sections to provide feedback to students as they worked through the task. For example, he created an annotated bibliography assignment and asked students to indicate the industry and issue they had chosen for the assignment. Bill then provided feedback and a grade to catch any misunderstandings early and so students could use the feedback to improve the assignment. "I think it's horrible when the student gets to the end and submits the final work and they've missed the whole thing" (Bill). Bill referred to his own experience as a student as the reason he provided summative feedback.

> The reason I did that it because I took a course once where all five assignments were due on the same day and I made a mistake consistently on all five assignments and got docked on all five. So I believe they can use that feedback and go improve. (Bill)

Like Harmony, Bill found students did not always read the comments he made on paper-based assignments. Using grading tools within the LMS made marking easier and Bill believed students would keep assignments, with rubrics and comments, that were electronic.

> The reason I switched over to [grading in the LMS] is because I would find that I would give students an assignment, it would take me a while to mark it, and then I

> would bring the papers back and most were in the recycle bin once they saw their mark and they saw the comments were acceptable … I mean there would be stack of them. I think the students really like the convenience [of LMS grading], they can look it up any time and they don't need to carry anything. (Bill)

Bill emphasized the need for instructions about assignments to be clear for students. Bill thought this was one of the most important things he did when teaching.

> I think my directions need to be clear. So, I've just noticed in the past, if you give somebody a whole bunch of directions and they start doing [the task] when you're still giving directions, you're trying to fix the problem. So be really clear what the steps are and what you're meaning. (Bill)

Helen created an assignment requiring students to examine the content within the course and decide how they would present it to a client. This allowed students to apply their learning to a real-world situation.

> I ask them to provide, nothing more than a single page, what [students] feel would be the key pertinent and relevant information that [they] would give a [client]. And I ask them to present it to me in a voice they would use for a [client]…. It's an example of how they have to apply their learning, they also have to review [the topic] which they are going to get on an exam … it's a good example of why we learn all of this stuff. Because you can't administer a medication if you don't know what it's for, because you don't know what to monitor if you don't even know why someone's taking it. And you can't tell your [client] what to look for if you don't know what it's for. (Helen)

Ben used paper-based assignments, he called "hand-in" assignments, to help students work through some of the difficult concepts. Ben explained the knowledge tests delivered through the LMS contained multiple-choice, "impersonal" questions whereas the questions in the assignments required students to work to understand the concepts.

> So, I have four of these hand-in assignments where you physically hand them in to me. And that would be my first indication of whether they know how to do [the problems] or not, and it's how I learn their names early in the term (Ben).

After students submitted their assignments, Ben posted a solution set for all of the questions as well as providing individual feedback. However, Ben was not sure how many students actually went through the complete solution set.

Group Tasks

Group tasks were practice activities students were required to complete collaboratively, usually outside of class time. Ben developed a case study assignment students completed in groups over a period of two weeks. Ben described the assignment as being "open to judgment by different people and [having] more subjectivity" than other assignments within the course. Students communicated in the LMS so Ben could view their ideas and ensure all students were contributing to the assignment. Although some groups used online collaborative tools to collaborate, Ben required students to submit "certain individual contributions" within the LMS so he could monitor ideas and contributions. An interim deadline allowed Ben to ensure all students within a group were participating and so he could intervene if needed. Part of the purpose of having a group assignment was to "facilitate [students] in exchanging their ideas" about course concepts (Ben).

Bjorn created a group project as a way to decrease the number of assignments within the course and manage the workload for both students and himself, as the instructor. He stated students need good feedback, but there must be a balance between the feedback provided to students and the time required for marking. "I wanted to create a learning situation that was good for the students and was also good for the instructor" (Bjorn). He also believed the assignment helped students apply theoretical concepts in a real-world way because students submitted a report and gave a presentation.

> I found that many students knew the content, but it is still a bit of a stretch and intimidating [when someone says] here is the data set, give me a report on Friday…. It has a hands-on quality and it really goes beyond solving a problem in class or knowing theoretically what [a concept] means … they have to describe the model in words, talk about it, [and] present it to an audience that may not have had statistical training. (Bjorn)

Bjorn further explained the data sets were taken from real-world examples, so students would need to discuss how to deal with missing values or "kinks and corners in the data sets that [were] deliberate." Bjorn provided the data set and indicated it was completely up to the students what model they would use "so they really get to use their own judgment, their prior knowledge … and think about the model." Group management, such adding students to groups, and providing files was done through the LMS. Students completed a group expectation contract, which eliminated students coming to him with concerns about group dynamics or how to address them.

Bjorn provided optional feedback near the beginning of the assignment and found "many students [knew] that participating in this feedback loop [would] make the product

better." The presentation portion of the assignment was completed two weeks before the deadline for the report so students could incorporate feedback from Bjorn and classmates. "I say to them that this is also your opportunity for feedback, so this is your presentation of work-in-progress … now you have the excellent opportunity to incorporate these points into your final report and spreadsheet" (Bjorn). The presentations were limited to four minutes, during which time students were required to deliver the results and implications. Bjorn set a short time limit to help students be clear and concise.

> And they give a short presentation in class, an executive summary of the findings and they only have four minutes to do that. I see this often at conferences, even trained professors, they are very poor at delivering the, ok you have these results, what does it mean, what are the implications. (Bjorn)

Bjorn's department incorporated "professional skills" throughout students' programs. These professional skills included knowledge and skills that extended beyond specific courses or concepts.

> We have formally integrated professional skills through the program and I have a paper for that written. So we have critical thinking, case analysis, ethics, communication, presentations, and use of technology. So they get the use of technology here, they use the stats software, they get team work, that's also professional skills, communication, critical thinking – you know. I can cover many profession skills with this group project and that is another thing I wanted to achieve … those skills that are beyond the specific subject. (Bjorn)

Bill created a group activity to help students collaborate on practice tasks. Students chose teams through a sign-up sheet in the LMS and then created a presentation on a chosen

topic. Bill found students collaborated in an online collaborative tool to create the presentation for the assignment, despite having an area in the LMS. “For a while, students were only using [the LMS], but now they exclusively use Google [to build their presentations]” (Bill). Bill used content from the student presentations to develop examination questions and then gave students a choice of which questions they would answer.

Laboratories

Laboratories were seen by instructors as a way for students to practice tasks related to the concepts presented in class. Ben structured laboratories as another way to apply theoretical concepts. Weekly laboratories provided students opportunities to use different software tools, such as spreadsheets, to complete problems under the guidance of a laboratory instructor. Bjorn’s students had eight scheduled laboratory sessions, as well as access to a computer laboratory and tutors to ask questions about their group project. Bjorn explained the scheduled laboratories.

> We have excellent lab tutors. And then we have a lab coordinator who is very seasoned who has done it for many years and has also, you know, student help. The structure of the labs is they would, let’s say we’re in class talking about doing a [statistical analysis]. The lab tutor would go through with all the students in the lab generically and then each student would get their own spreadsheet with their own data set. (Bjorn)

Haley, Halina, and Helen noted laboratories were part of the program curriculum, but were outside of their particular courses and were taught by other instructors. In preparation for a simulation event or worksite placement, students might attend a skills lab.

> Students go into the skills lab and do a skill review just prior to or the day before. So let's say they know they're coming in[to the simulation event] to do IV meds, we don't want the focus to necessarily be on remembering how to use the pump. So, we really want them to problem solve, decision make, make sound clinical judgments so they are not distracted by pushing buttons, they've got that down. (Haley)

Helen met with the laboratory instructor to determine what types of practice tasks students were completing and how those might align with her course concepts.

> I will consult with the instructor of the lab portion and I talk to her almost every week. So, what are you doing in the lab because that's where [students are] doing the practical application piece. So if I know she's already taught, for example how to inject insulin, I don't have to repeat that portion. I can say, well just like you did in the lab, these are the main points. You can also link things to [what students have] already learned … trying to get them to put the pieces together of the big old puzzle. (Helen)

Because the laboratories were often organized and facilitated by people other than the participants in my study, there are limited findings on the specific ways laboratory tasks were designed.

Simulations

Laurillard (2013) described simulations as computer-based, adaptive media mimicking an aspect of the real world and responding to students' actions. Students use intrinsic feedback to improve their performances. Brindley et al. (2007) wrote simulation encourages experiential learning. Haley, Brent, and Brandon used simulations with their students.

Brandon used a publisher's simulation software to teach word processing, spreadsheet, and digital presentation applications to students. Brandon explained students progressed through activities called trainers and graders. Trainers presented concepts and then graders required students to apply the concepts. Students completed the trainers the night before class and then worked on the graders during class. This allowed Brandon to "walk around" the classroom, answer questions. and see if students were having difficulty. Brandon described what a simulation might look like.

> A simulation for Excel might be dealing with payroll. So [students] are given the raw data for ten employees, the hours worked, the rate of pay. And then they have to start building formulas that calculate regular pay, overtime pay … and maybe I'll slip in a tax calculation or something like that. So, they're learning how to build formulas through the simulations…. And the grader is going to have [students] apply exactly the same concepts … but it will be a different scenario. (Brandon)

Students purchased a code for use of the simulation software and access to an online textbook, but were not required to purchase a physical copy of the textbook for the course. Brandon allowed students to submit the graders multiple times to ensure students understood the concepts. Brandon stated that he had always liked the concept of mastery learning but was limited by being able to grade multiple submissions. Automatic grading provided more timely feedback to students and the ability to allow students to submit the simulation activities multiple times.

> So, if the student wants to fix his formula and submit again, and he ends up getting a better mark for it, why would I want to stand in the way of that? He's learning, he's getting a better mark, he's happy, and I'm not doing any marking. (Brandon)

Assignments and examinations were also created using publisher simulations; however, Brandon modified questions and scenarios to create, what he called, an "exaggerated grader." Students received their grades immediately upon submission. "With the immediate feedback, it's not like having to wait a week or two. By then a student has moved on to other things."

Another benefit of the publisher's graders was that it helped Brandon identify inappropriate collaboration between students to ensure students understood academic integrity within their first term at university.

> When students download their files, they are invisibly tattooed, it's almost like DNA in the file. So, if you download your own files and submit your files, no problem. If you download your files and hand them to another student and they submit them, it flags both of you with a potential integrity violation. And if you even do a copy and paste from another student's file, it will tell me what percentage you copied and who you copied from. (Brandon)

Brandon stated the "rich tools" available from publishers "have almost completely changed the way [he teaches] the course." He stated using a simulation instead of traditional lectures, assignments, and examinations is "better" for students, but he had to "let [his] ego go because the classes are not about [him] anymore" (Brandon). Brandon needed to review and choose resources and technology carefully because "there is so much out there." His teaching experience allowed him to accurately determine the appropriate workload for students. "As a new instructor you don't have a feel for what's a reasonable work load even course-wise or week by week. But if you've been doing it for a while you have a good sense of that." Brandon also took time to attend sessions at another post-secondary institution to learn how to better use the tools.

Students in Brent's class completed a computer-based simulation to choose a marketing approach for a product within the manufacturing sector. The course, and simulation, provided a capstone for the program. Instructors who taught the course collaborated to evaluate and decide upon the simulation program students would be required to purchase. Students worked in groups to compete in four regions of the world with both a high-end and low-end product, meaning that students might use eight different approaches. Brent explained students think about multiple concepts they learned in previous courses and that incorporating concepts in the simulation can become complicated.

> They'll have a manufacturing plant, so how much do they pay their employees, do they give any incentives, think about how many units of product to make and to ship, so there are inventory things to think about. Then they get into market decisions, how to price their [product], what kind of warranty and those kinds of things. Then they get into corporate social responsibility, so do they donate to charity, do they try and have a more environmentally friendly plant? They also look at financial decisions, whether they sell shares and those kinds of things. And the idea is to get them to use all that they have learned in the program … and realize that if they decide to do something, like lower their prices, it has an impact throughout the organization. (Brent)

Students were given class time to work together in groups on the simulation which allowed Brent to circulate to breakout rooms and act as "a coach that will ask questions and, in some cases, answer questions" (Brent). Brent explained he would not answer questions that would lead students to think he had told them what decision to make. However, he would answer questions by engaging in a general discussion about the marketplace. "I will point them to

things in the analysis and ask, if you look at this section, what does it tell you? Why do you think this is happening?... Hopefully some light bulbs will come on" (Brent). Brent also used an administrator's report to help groups that appeared to be struggling.

Brent found the simulation could be intimidating for students, perhaps "because it's a break from 'tell me what's on the exam, I'll tell you what you need to write in the exam'. They get very excited and intimidated because there is no right answer." Brent prepared students for the simulation by reviewing concepts from previous courses, including leadership, team building, negotiation, and persuasion.

> I don't introduce new material because they had the material [in previous courses]. I'm just getting them to think about it. And then we spend some time thinking about their own skill set … what skills do they have and what complementary skills do they need from other people.… We also use contracts … and [the groups] that take it seriously tend to be more successful. (Brent)

Brent structured in-class activities to help students "get to know the other students in the course" and to practice working in groups to "have a better sense of who they will work with" before the start of the simulation assignment. Brent created two "check-in" points where students completed self and peer evaluations. By looking at the evaluations, Brent determined when he would need to act as a facilitator to address group issues. Brent also prepared students for using the simulation software. "Students spend a lot of time reading, going through video tutorials and files, and then just trying the simulation themselves" (Brent).

In teams, students completed a reflective report and gave a five-minute presentation at the end of the simulation. The reflective report consisted of students examining their

strategic plan, what happened during the simulation, why it happened, what decisions were made, team dynamics, and what they learned.

> So they've done a strategic plan at the beginning of the simulation – this is what we planned to do – and at the end this is what actually happened and why did it happen. We succeeded or failed, what went on in the marketplace, what went on in team dynamics and decision-making, what did we do well as a team sitting around a table. What were the good decisions we made? What were the bad decisions we made? And what we learned from the process. (Brent)

The presentation consisted of a brief summary of the simulation process, followed by questions from classmates and the instructor. Brent described the learning during the presentation.

> We have a class where it's set up like a series of short board meetings where each group sits up at the front for about five minutes or so and goes through the process in brief form … and then we open it up for questions. And it is actually a very interesting class because there is no shortage of questions … and [students] want to know, how did you get your production costs so low, or why did you do that? I typically have to shut the thing down because we run out of time. (Brent)

Brent emphasized the importance of the presentations and questions in the learning process. "If we didn't bring it to some conclusion and say, 'what did you learn from this', there isn't a point in doing it" (Brent). He believed students learned concepts through the simulation. "There's no concern that they would go through a simulation without understanding the concepts." Brent also explained the time that it would take for a new instructor to become familiar with the simulation.

> I would say, it would take somebody a couple of weeks, not continuous time, going through doing the reading, trying some things, playing around. There are many details in the simulation that you end up discovering as you go along because a student asks a question. (Brent)

Haley described herself as the "go to person" to support other instructors to design experiential learning with high fidelity simulation. She stated there was a "well-defined process with simulation" that began after students completed readings and quizzes, as described previously. Simulation was integrated with the curriculum so core "experiences [were] embedded in existing courses and mapped across the curriculum" (Haley). The learning goals and objectives guided the use of technology. "It's really what we want students to learn that drives what we do and then we select the technology that best fits" (Haley). Haley worked to "flesh out the differences between helping students prepare [for simulation] one to two weeks ahead of time and then helping them prepare the day of [the simulation event]." Students were anxious entering a simulation experience, especially when working with high-fidelity mannequins that had breath sounds, heart sounds, pulses, blood pressure, and the ability for an instructor to speak through the mannequin. Some of the simulations incorporated difficult concepts and thus had complex scenarios. To decrease their anxiety, Haley ensured students had an orientation for the simulation event.

> We know that anxiety for students, especially when they're working with high-fidelity mannequins and there are cameras all around them, anxiety is certainly a factor. So, in order to reduce student anxiety, we spend anywhere from 20 to 30 minutes before the event. We just want to ground their learning experience and refresh their focus on concepts or learning objectives for the day. We establish ground

> rules for the day … what happens in sim stays in sim. We reinforce confidentiality, confidentiality of their performance, of other students' performances, as well as the scenario itself. (Haley)

Because of the anxiety and stress students felt, Haley described what she called "safety nets."

> A safety net would be something like calling a timeout. They can call a team huddle, and some people call it a huggle. If you're panicked and don't know what to do, you can call a team time. So, they get a time out with their team and everything is suspended. They can come together and have a chat, reframe, refocus, and remobilize themselves. (Haley)

Haley described simulation training as team-based training where students had different roles in a scenario. She indicated the instructor was able to provide cues or prompts during the scenario if students were having difficulty. "There are cues and prompts that we use … if I'm engaged as the client's voice or if I'm the person answering the phone" (Haley).

Feedback to students was structured as "having students unearth their thinking around different choices." Haley stated she did not provide right or wrong feedback to students but rather, during a debriefing session, helped students reflect on why they might have made certain choices. Haley emphasized the importance of the debriefing session to consolidate students' understanding. "We spend a lot of time in discussion, it's basically three to one. For every minute I'm in sim lab, I spend three minutes debriefing. So, if I'm in a 10-minute sim, I debrief for 30 minutes" (Haley). Through a conversation with the team of students, they discovered what might have caused them to act in a particular way and then allowed them to plan for how they might act differently in the future. Haley provided an example of a conversation with a student.

> For example, I might say … I'm concerned because what resulted was an error. So tell me more about the process you were going through. Let's try to pick this apart so we can better understand where the mistake came from. So here we are in full acknowledgement of the fact that there was a mistake, but not focusing on punishment…. Was there something that was happening for you at the time, were you distracted, were you having an anxiety attack, was there something else happening in the room that threw you off? Let's figure out what was happening and then come up with a plan to make that look different … it's really focused on understanding as opposed to just giving feedback and students have epiphanies and they just about always tell me something I wouldn't have thought of. (Haley)

Haley emphasized the benefit of using simulation for "formative and reflective" learning. "It's about helping [students] understand their own behaviour and then have them change their behaviour, or thoughts, or attitudes to create a better and safer place for our [clients]" (Haley). She also acknowledged that the reflective portion of simulation is required for students to learn or master particular skills.

> So mastery learning really involves the learning of the skill and then having the student exposed to the application of that skill in context. And the context would change. So you and I, who would be considered clinical practice experts would be exposed to – I think the literature supports 10,000 times or 10,000 hours of sort of, integrated application of something in different contexts that leads to expertise. So there's really this false sense of security having students follow a checklist, repeat a demonstration, and then say that they've mastered a skill because they haven't mastered a skill. (Haley)

Haley recognized the support from administrators and staff working in the simulation center that allowed instructors to incorporate simulations into the curriculum.

> We had this great institutional culture that worked in our favour and we had a wonderful working climate and people were collaborative … we had competent people and we had all of these pioneers here, innovators who were go-getters and really intrigued by technology and wanted to create wonderful learning for students. (Haley)

Worksite Placement

Halina's students were motivated to engage in a practice task through their worksite placement experience. Using concepts from previous theory courses, students applied the concepts in a practical setting. Halina emphasized the comprehension level required of students to move from "learning content to applying it." Each worksite placement experience was five weeks long during which Halina observed each student. She found "by week two [she had] a good sense of where the student [was] at" and entered daily feedback on how well a student was achieving learning outcomes in a document on a shared drive. Halina discussed, with a student, how well a learning outcome had been achieved and areas that needed further skill development. Halina entered her evaluation together with each student to create a feeling of safety so students were comfortable asking questions.

> We discuss it together, when I input [the evaluation and feedback] and [students] can give their own feedback…. I make it very safe for them … so [students will] see the input right away and will know right away, this is what I have to work on. (Halina)

Before students completed a practice task with a client, they explained policy and procedures.

> There are several steps. They have to read the policy and procedures of [the educational institution] and the [clinical setting], avail themselves to the technology, read the doctor's orders and care plan. Then they walk me through what they are going to do and then we go to the [client's] room. (Halina)

Halina explained students may require cues when explaining policy or processes. Students would be assessed as "outstanding" when:

> they didn't require cuing, they were very strong in being assertive, for example if they saw a lab value that was low, they came to the instructor, they initiated a conversation … they were able to critically think. (Halina)

Although the majority of practice tasks were completed individually, Halina held, what she termed, post-conferences with a group of students. The post-conferences provided a place for students to discuss their experiences and look at ways to improve their understanding by questioning professional practice.

> I use our post-conference to support students and let students talk and reflect. So we do have a lot of face-to-face discussion … I tell them that I want them to have that spirit of inquiry. I want them to be curious … I tell them, "I want you to ask questions, why is this like this, I don't know how to do this" because that's what creates a professional [within the discipline]. (Halina)

Helen found that sometimes students needed to apply concepts in a workplace setting before fully understanding.

> Sometimes they actually have to be out in practice, doing it themselves on a real person. I've had students some back. My course is taught September to December and they'll come back in March and stop at my door and say "ah, it makes sense

> now." It's hard sometimes to teach something in isolation of a real person. They don't have the hands-on experience to be able to apply the information.

Reflection and Adaptation

As described earlier in this chapter, instructors provided opportunities for students to receive feedback and reflect on their learning. In addition to providing feedback on individual assignments once they were submitted, Harmony and Bjorn provided optional feedback to students before practice tasks were submitted. Bjorn and Brent included reflective portions to their group tasks through class presentations. Haley emphasized the formative and reflective learning that occurs in high fidelity simulation. Post-conferences allowed Halina's students to discuss experiences and improve their understanding of professional practice.

Bill included reflective journaling for students, which allowed students to think about their learning and concepts in the class. Bill provided summative feedback, again to ensure students were "on track." Harmony included reflective journaling as a way to have students think about their learning, and bring the ideas to class discussions. Although students did not initially like journaling, they found it helped their learning.

> I also got them to journal a lot in that class. At first they kind of complained about it but they said that they had a deeper understanding of who they were as a student and as a professional than if they hadn't done that. I think that's when they said that they wished the class was in first year rather than fourth year. (Harmony)

Ben encouraged students to reflect on concepts by explaining what had been discussed in class to a family member or friend. This suggestion was used to help students ask questions of themselves to check they have understood concepts.

> I will suggest to them, if they leave the class and if they bump into a friend in the hall, or if one of their family members ask, "what did you do in class today?" and you want to explain it to them in two sentences, boil it down to the fundamental problem or business operation that we were trying to solve, could you do that? So I think they would hopefully reflect back on the original problem. (Ben)

Summary of Findings

Practice tasks provided students with the opportunity to engage in experiential learning and reflect on their understanding of course concepts. The following list summarizes the main findings in this chapter.

1. Problem-solving activities were used by instructors so they could check student understanding of course concepts and clarify common misunderstandings (Ben, Brandon, Bill, Bjorn). Ben, Brandon, and Bill circulated through the class to assess students' progress, provide feedback, and answer questions.
2. Four instructors created real-world tasks to provide a context for students to apply course concepts. Ben asked students to solve a real-world problem, using existing knowledge, before he presented concepts in class. This was done to introduce concepts, build student intuition, and help students understand why they were asked to use formulas or models. Bjorn provided real data sets so students would learn how to deal with the complexities of real data. Helen required students to create a one-page document on how they would present course information to a client. Halina's students wrote a paper integrating theory to practice as experienced in a worksite placement.

3. Individual student assignments were created to help students adapt and refine conceptual understanding while creating a product such as a research paper or problem sets (Ben, Bjorn, Bill, Brad, Harmony, Helen, Halina). Although they provided feedback on papers, Bill and Harmony found that students did not always keep or use the feedback. Ben provided a detailed solution set and was not sure how many students went through it.
4. Three instructors used group tasks for activities that could be approached in different ways, might not have a correct answer, or might have a higher workload than could be completed by one student (Ben, Bjorn, Bill).
5. The LMS and online collaborative tools were used for administrative tasks and communication around assignments and group tasks. Haley, Harmony, and Bill used the LMS to receive student submissions and provide grades and feedback on individual assignments. Bjorn and Ben set up areas in the LMS for students to collaborate on group tasks. Bill noticed students relied on online collaborative tools outside of the LMS for group communication.
6. Bjorn and Brent asked students to complete group contracts to set expectations of group members for group tasks or simulations.
7. Four instructors provided feedback to students before their final assignments or group tasks were completed to identify misconceptions before a practice task was completed and allow students to improve their product. Harmony offered to read the first paragraph of students' assignments. Bill split assignments into sections so he could catch any misunderstandings early. Ben gave an interim deadline for students to submit contributions through the LMS to ensure all members in a group were

participating. Bjorn offered to provide feedback on a group task at the beginning of the term. He also had students present their task to the class two weeks before the report was due so that students could incorporate feedback into their final report.

8. Laboratories provided ways for students to access tools and practice course concepts. Laboratories were often organized or facilitated by people other than the instructors who participated in my study.
9. Three instructors used simulations to help students develop conceptual understandings (Haley, Brent, Brandon). Haley and Brent provided pre-simulation preparation to ensure students were prepared and a de-briefing or summary process at the end of the simulation. The summary was seen by Haley and Brent as the most important part of simulation to ensure students had an opportunity to reflect on their experiences, learn from any mistakes, and plan future action.
10. Worksite placement provided students with an opportunity to ingrate learning into a practical environment (Halina).
11. Seven instructors (Ben, Bill, Bjorn, Brent, Harmony, Haley, Halina) provided ways for students to reflect on their learning. Harmony and Bjorn provided optional feedback to students before practice tasks were submitted. Bjorn, Brent, Harmony, and Halina created reflective activities. Bill and Harmony included reflective journaling.
12. Instructors collaborated to make decisions about student learning. Haley was the "go-to person" to help integrate simulations across the department curriculum. Brent worked with colleagues to decide on simulation software. Laboratories supported the learning of course concepts and tools, such as computer software.

Chapter Summary

Instructors in my study created a variety of practice task activities to help students develop an understanding of course concepts. Practice task activities were designed as a way for students to tie course concepts together and create a product such as a research paper, report, presentation, or performance in a simulation. Brent described the simulation as a course and a program capstone project. Helen, Ben, Bjorn, and Halina aligned practice tasks with real-world situations.

Although instructors provided extrinsic feedback, they were not sure how many students used the feedback to improve their conceptual understandings. Bill and Harmony noted students did not always keep the feedback they provided on students' papers. Ben did not know whether students reviewed a detailed solution set. Practice tasks involving presentations and simulations were designed with more formal feedback mechanisms that were intrinsic to students' actions. Bjorn and Brent included student presentations as a way for students to receive feedback from both the instructor and other students. Bjorn encouraged students to use the feedback to improve their final report. Computer and high-fidelity simulations responded to students' actions, allowing students to see how they may need to adjust their actions and in turn their conceptions.

The findings, as well as those outlined in previous chapters, indicate the ways instructors presented course concepts, provided opportunities for students to clarify their understandings, and designed practice tasks to help students develop an understanding of course concepts. The following chapter provides a synthesis and discussion of the findings from my study in relation to the literature.

Chapter Seven: Synthesis and Discussion of Findings

Laurillard's Conversational Framework provides a way to examine how instructors use instructional strategies and learning technologies to help students learn within a formal post-secondary environment. I organized my finding chapters by examining the parts of the Conversational Framework to allow a focused exploration of instructional strategies and learning technologies used by instructors in my study. However, instructors approached teaching from a more holistic perspective, combining strategies from multiple parts of the framework, and I have, therefore, organized my synthesis and discussion chapter to more closely match the ways that instructors approached their teaching.

As I completed my synthesis and returned to the literature, I became aware that I asked instructors what they *did* in their teaching. I did not ask instructors about their conceptions of teaching and learning. Drawing from Pratt's (Pratt, 1992; Pratt et al., 2001) work on teaching conceptions, I considered the interactions among actions, intentions, and beliefs. From questions about actions, instructors shared *why* they chose instructional strategies and learning technologies. In this chapter, I focus on the intentions and beliefs that led instructors in my study to choose particular actions. Sub-themes within this chapter integrate the themes of the previous three chapters and include: (a) learning in a post-secondary environment, (c) learning technologies, (d) learning-centred education, and (e) comparison of the literature and findings.

Learning in a Post-Secondary Environment

One of the purposes of post-secondary learning is to ensure students become critical learners who do not rely on teachers to provide information in ways precluding independent thinking (Laurillard, 2013). Further, the role of the teacher is to provide guidance to help

students develop the autonomy that is "needed for social and self-directed learning [that] is imperative for continuous lifelong learning" (Merriam & Bierema, 2013, p. 73).

Laurillard (2009, 2013, 2020) described her Conversational Framework as a series of exchanges between the teacher and students which occurs at two levels, the discursive and the experiential. Laurillard (2009) noted the importance of discursive explanation in formal, post-secondary learning environments when the teacher articulates and discusses "theory, ideas, concepts, and forms of representation" (p. 8). The experiential level of the Conversational Framework involves "acting on the world, experimenting and practicing on goal-oriented tasks" (p. 8). Drawing from Papert's (1980) constructionism, Laurillard explained students develop a conceptual understanding when they engage in multiple attempts to achieve a goal, reflect on how well they have succeeded in achieving the goal, and adjust their action and conceptions. The two levels are connected through adaptive and reflective activities by both the teacher and students.

Orientation to Learning

Laurillard (2013) stressed "if students are to have any control over their learning" (p. 200), the teacher must provide an orientation to the concepts students will encounter. Instructors in my study recognized the importance of orienting students to course concepts. Helen provided tips to how students might approach concepts within the course through her introductory letter, which she sent to students before the first class. Helen sent this letter before classes started, ensuring students considered strategies for approaching course topics before class started. Students should know why a topic is important and interesting, the prerequisite knowledge or skills, and the learning objectives and how they are assessed (Laurillard, 2013).

Gaining attention. Gagné's events of instruction are included in this chapter to understand the iterations that can occur between the teacher and student at the discursive level of Laurillard's Conversational Framework. According to Laurillard (2009), instructional theories influenced by Gagné can guide the presentation and organization of concepts. Gagné's first level of instruction, gaining attention, can be achieved by including novel ways of presenting material, such as showing an animation, giving a demonstration, or asking a question to stimulate students' curiosity (Gagné et al., 2005). Hanson discussed scholarly articles at the beginning of class as a way to "generate interest." Helen also presented scholarly articles or websites to start a class as a way to present concepts in different ways. Ben created a real-world "exploratory" activity for students to try to solve. Ben said this type of activity helped to "build a little intuition" and helped students better understand the learning objectives.

Learning outcomes. Laurillard (2013) explained the need for well-defined learning outcomes so a teacher will "know if the students do understand, appreciate, or see in a new way" (p. 182). Gagné's second event of instruction, informing learners of the learning objectives, provides learners with information about the knowledge or skills they are expected to perform. "Telling learners what is expected will help them focus on learning that skill" (Gagné et al., 2005, p. 196). Formulating and communicating learning objectives can also help the teacher stay on track. Bill used learning outcomes, not only as a way for him to assess student understanding, but also as a way for students to know what they needed to be able to do for a particular topic or concept within the course. Bill specifically articulated learning outcomes to his students and aligned learning outcomes with learning activities. This allowed students to self-assess whether they understood concepts and then take

responsibility for further learning as needed. Hanson discussed study habits so students would understand how to use the tools he provided. He found that reframing students study habits and responsibilities helped students understand "not everything would be handed to them on a silver platter." Upon providing what he called "skeleton notes" Hanson explained to students how they could use the notes and understand the wording of the learning objectives. Hanson also discussed how the readings and other resources provided to students aligned with the skeleton notes and objectives.

Prior Knowledge

Within Laurillard's Conversational Framework (2009, 2013), students' conception relates to learning acquired as well as students' approaches to learning. Ausubel's (2000) meaningful learning provides a way to think about students' approaches to learning. Laurillard (2012) tied Marton and Säljö's (1976a, 1976b) research on deep and surface approaches to learning to Ausubel's (2000) meaningful learning.

Ausubel (2000) described the need for learners to "genuinely attempt to integrate [learning material] with what [they] already know" (p. 34). The assimilation process in meaningful learning begins with the anchorage of learning material to existing ideas and cognitive structures. The use of advance organizers can help to make connections between existing and new information. Gagné's third event of instruction, recalling prerequisite or related knowledge, allows learners to build upon what they already know (Gagné et al., 2005).

Harmony emphasized her role in interpreting readings for students so they would have "foundational knowledge" required to engage in class discussions. Hope alerted students to concepts that would reappear in their program to help students understand

interrelationships among concepts. Ben believed a real-world problem, requiring students to draw upon current knowledge, provided the context to course concepts. Bill ensured he presented concepts that were "just at the spot above where [students are] at" to allow students to connect concepts to prior knowledge. Bill did not "give them, what I'd call a hard thing, because to me there might be a stumble." Bjorn started his course with a simple concept, such as "data in general." Bjorn went back and forth between what he called the "micro-macro perspectives" to ensure he explained how concepts tied back to previous concepts and how they introduced upcoming topics.

Hanson and Helen reviewed material that had previously been discussed in class as a way to stimulate previous or related knowledge. Helen spent time on "foundational concepts" so students would have the understanding required to learn future concepts of the course. Helen noted the difference among students, stating some "adult students are very well prepared … [while] others require more hand-holding."

Presenting Concepts

Lectures can act as a way to convey the teacher's conception and provide the first part of the discursive loop. However, Laurillard (2013) rejected the transmission model of education and cautioned lectures, on their own, can be unreliable because students can develop misconceptions and further, the teacher may be unaware of these misconceptions. Although there is criticism of the use of lectures (Johnson & Barrett, 2017; Laurillard, 2013; Vaughan et al., 2013), they continue to be a prevalent teaching method within post-secondary education and can act as a point of comparison (Laurillard, 2013).

According to Gagné (1965), a lecture can be used to motivate learners to succeed by relating topics to the larger objectives of a discipline. Lectures can also inform learners of

expected learning outcomes. However, there are limitations to how well a lecture prompts and guides learning. When examining the activities of learners within a lecture, Gagné wrote "some students do not have the prerequisite knowledge, others are inattentive, others may be bored. Most may be taking notes, which, so far as anyone knows, is an entirely useless activity quite unrelated to learning" (Gagné, 1965, p. 287).

Instructors in my study described their classes in ways that align with Biggs and Tang's (2011) suggestion "that the term 'lecture' describes the situation and not a teaching/learning activity" (p. 133). Brad used the term lecturette to describe a short, verbal presentation which allowed time for "application of concepts in class time." Bill also emphasized "a short presentation and then an activity that we'll do in class." Helen explained her classes included "a verbal presentation … [and] case study discussions." These instructors believed students should be active during a lecture situation.

Gagné's fourth event of instruction, presenting the stimulus material, involves the presentation of content. When presenting stimulus material, the teacher presents concepts in a way that matches the learning that is to occur (Gagné et al, 2005). Johnson and Barrett (2017) found students performed better on a "Jeopardy-style quiz" (p. 46) when they had received a didactic lecture than when they participated in an active learning session. Students who participated in the passive instruction, or lecture, were able to correctly recall information needed to complete six categories of five questions without making an error (Johnson & Barrett, 2017).

Ausubel's (2000) meaningful learning includes learning material that is nonarbitrary and nonverbatim. Instructors in my study explained the challenges of "stuffed courses" (Bjorn), limited class time (Ben), and teaching difficult concepts (Ben, Bjorn, Haley, Halina,

Harmony, Hanson, Hope, Helen). Bjorn emphasized his role in distilling material to the key concepts. He used his PowerPoint presentations, which will be discussed later in this chapter, to present core concepts or issues and a physical whiteboard in class for graphs and solving problems. Bjorn believed it was "very easy to make concepts complicated" and worked to present concepts in ways that were nonarbitrary. He stated he is able to "convert a number of students to people who appreciate numbers and stats."

Ben shared the example of providing a video of a warehouse to provide context to students. Without context, students who had never been in a warehouse might find his examples and explanations arbitrary.

Student Conception

In her Conversational Framework, Laurillard (2009) described student conception as the ways in which students articulate their understandings to the teacher and other students, and how the teacher responds by providing hints or clarification of concepts.

McAlpine (2004) wrote students complete "invisible aspects of the learning process" (p. 119) such as how they conceive of a learning task or what strategies they use to approach what "they believe they should be learning" (p. 119). Because these aspects of learning are frequently invisible to a teacher, McAlpine argued a large part of learning should be devoted to practice activities during which students complete practice tasks, articulate and negotiate ideas, and receive formative feedback. Teachers must provide the structure and feedback to prepare students to effectively take responsibility for learning tasks.

Instructors in my study expected students to ask questions if they did not understand material. Ausubel (2000) wrote that students show responsibility for their learning "when they take it upon [themselves] to ask the necessary questions about what [they do] not

understand" (p. 34). Helen believed students would ask questions if they had misunderstandings or needed reassurance. Helen either confirmed their understanding or provided clarification. Bjorn recognized, while some students asked questions in class, others did not. If one student asked a question, Bjorn presumed others had the same question. He emphasized the need to "create a climate in class where they feel comfortable asking questions." Instructors believed students had a responsibility for asking questions and instructors ensured students could ask questions in a variety of ways, including class time, email, and office hours.

Although students need to take responsibility to ask questions, Biggs and Tang (2011) wrote it is up to the instructor to design teaching and learning activities that will help students who may not have the knowledge or skills required for learning in formal university environments. According to Laurillard (2013), when students use a deep approach to study text, they look for meaning holistically and therefore preserve the original structure of the text and its intended meaning. However, when students use a surface approach to study text, they focus on key words and phrases individually and therefore distort the original structure and meaning. Laurillard wrote learning activities, other than reading text, can have a structure or approach students must understand in order to successfully approach the activity. For example, problem-solving is not only about getting the correct answer but also about how the structure of a problem "embodies a meaning, a description of the world" (Laurillard, 2013, p. 47). Harmony emphasized her role in helping students interpret course concepts in ways that aligned with being a professional within the discipline. Ben felt it was necessary for students to build intuition around the structure of problems when he asked students to use current knowledge to solve an every-day problem. Halina asked students to complete a

concept map assignment to demonstrate understanding of the relationships among concepts. Novak and Cañas (2015) wrote that concept maps can be used to help students work through and show the hierarchal and interrelated structure of concepts.

Bjorn, Ben, Brandon, Brent, Hanson, and Helen used drill and practice activities to help students learn concepts and expectations for an examination. Drill and practice activities can help students acquire skills and concepts and can increase retention and transferability by providing structured practice (Ausubel, 2000). Bjorn and Ben assigned mathematical problems to help students learn application of mathematical models or formulas. Helen and Hanson provided questions similar to what students would see on examinations to help students learn expectations for assessments.

Classroom assessment techniques (Angleo & Cross, 1993) were used by instructors to check student understanding. Ben used a student response system (SRS) to deliver questions to assess students' understanding and determine when he needed to clarify topics. Ben did not use SRS activities as frequently as he used to because class time had decreased and he felt he did not have the time to re-explain multiple topics. The use of SRS will be discussed further under learning technologies. Ben, Bill, and Hanson used muddiest point activities (Angelo & Cross, 1993) in which students were asked to document topics they found most confusing or muddy. Instructors provided further explanation and clarification on the muddiest points during future classes. Brent and Bill used the term "active learning activities" to refer to classroom assessment techniques, such as think-pair-share and in-class discussions to help students articulate their understandings and hear other students' perspectives. Brent and Helen presented case studies to facilitate in-class discussion and

application of course concepts. The use of discussions and case studies will be presented in a later section of this chapter.

Providing guidance. Gagné's fifth event of instruction is providing learning guidance. Gagné et al. (2005) described "providing learning guidance" (p. 198) as helping learners make connections between what they know and the concepts being learned. Ausubel (2000) described meaningful learning as the interaction between existing and new knowledge or concepts and the resulting changed understanding. Teachers may provide guidance by providing hints or asking questions; however, the questions do not tell students the answer, but rather suggest the line of thought required to understand concepts. The communication provided by the teacher is not about presenting concepts, but is rather about "stimulating a direction of thought" (Gagné et al., 2005, p. 199).

When Bjorn answered student questions that were sent by email, he guided students to previous course materials and asked whether they had thought about certain things when working on a problem. Hope emphasized her role in guiding students and created notes to help students know what to focus on in the online course materials.

Toledo (2015) wrote Socratic questioning can create robust learning for students by guiding "students through the critical thinking process" (p. 275). Teachers and students ask questions that challenge common assumptions, ask for evidence, clarify viewpoints, or explore consequences. Brent used Socratic questioning to help students during a computer simulation. "I will point them to things in the analysis. If you look at this section, what does it tell you? Why do you think that is happening? Look at you compared to them, what do you see?" Brent emphasized his role in helping students come to an answer rather than providing answers to students. Halina used Socratic questioning to help students in their worksite

placement. By questioning students about medications, mechanism of action, and professional considerations, Halina helped students determine whether they were prepared to provide safe client care.

Sociocultural learning. Sociocultural learning occurs when students engage in discussion and "recognize the value of having to articulate an idea, and to negotiate in the continual iteration of discussion, the terms of the linguistic representation of an argument or idea" (Laurillard, 2009, p. 9). When students try to express an idea, they can realize when they have gaps in knowledge or misunderstandings of concepts. A teacher will also realize there are common misconceptions and can then provide clarification. Discussions, in general, will be included in this section. Online discussions will be included under learning technologies.

Harmony described discussions as "engaging with peers." Harmony spent time interpreting course concepts for students so they had the foundational knowledge to participate in discussions. She believed peer learning was a "good way to learn" and felt most students came to class being open to classmates' ideas. Evaluating other's perspectives and recommendations was an important part of students' learning.

To facilitate discussion within their classes, Helen and Hanson distributed materials to students to decrease the notes students needed to take. Hanson found his skeleton notes freed students to talk, ask questions, "and be a bit more participatory." Helen included case studies and questions in her digital presentations to start discussions with students. The case studies provided a way to help students develop their thinking as practitioners. "A case forces [students] to consider all the potential options and potential outcomes and potential solutions" (Helen). A case study allows students to approach problems that may be

encountered in a real-world or professional context. Case studies help students fill in gaps between theory and practice through critical thinking, skill analysis, oral and written communication, and, when case studies are used in groups, teamwork and collaboration (Penn et al., 2016). Brent also used case studies to facilitate class discussions. When students articulated ways to solve the case, it helped Brent " pick up where [students were] going off track."

Individual assignments and examinations. Gagné's sixth event of instruction, eliciting performance, involves students showing both the teacher and themselves that they know how to complete a particular task (Gagné et al., 2005). Gagné et al. (2005) described a structured process whereby students complete a particular task after having observed an example performed by the teacher. Students receive extrinsic feedback on their performance, which is usually provided by the teacher, and which will be discussed under the "Reflection and Adaptation" section of this chapter.

Bill and Ben provided class time for students to complete work on assignments. Both circulated through the classroom to ask students questions and to clarify misconceptions while students were working on assignments. Bill was not sure students knew what was expected of them and circulating through the classroom when students worked on assignments allowed him to "check in with the learners."

Helen, Halina, Harmony, and Hope designed individual assignments to help students integrate theory and concepts related to professional practice. Helen's one-page assignment required students to determine how they would present information about a course concept to a client. Halina's assignment required students to reflect on an experience at a worksite through a theoretical lens.

Instructors viewed examinations as a way for students to articulate their understandings and identify misunderstandings. Hanson and Helen provided practice examination questions to help students determine where they might have misunderstandings before an examination. Hope and Bjorn reviewed examinations with students, focusing on common errors.

Experiential Learning

Learning goals at the experiential level of Laurillard's Conversational Framework require action, or practice, by students to allow development and refinement of skills. Practice at the experiential level informs the discursive level of learning. Students may have choices in how they approach goals as well as how they structure or create the final product (Laurillard, 2013, 2020). Experiential learning provides a connection between learning and personal experience (Dewey, 1938/1963). Biggs and Tang (2011) described "putting knowledge to work" (p. 160) and emphasized the need for students to apply their knowledge. Scott (2001) described the "knowing how" cycle (p. 350) as receiving demonstrations, building models, and solving problems. However, knowing how requires comprehension learning, or "knowing why" (Scott, 2001, p. 353).

Papert (1991) described constructionism as learning by making. The author explained that constructionism shares the ideas of constructivism or "building knowledge structures" (Papert, 1991, para 2) within the context of creation of a "public entity" (Papert, 1991, para 2). Student work is guided by the progress of the work itself and not by a pre-established plan.

Merrill (2002) wrote problem-centered learning environments are the most effective in supporting student learning. Learning is promoted when students receive a demonstration

of what is to be learned rather than simply being told (given information), engage in solving real-world problems, integrate learning to previous knowledge, and apply their learning (practice) to improve their performance.

Bjorn demonstrated problem-solving in class and then asked students to complete a similar problem before the next class. Students were invited to share questions or difficulties they experienced when trying to solve the problem so Bjorn could clarify concepts and how to approach problems. Bjorn found this process helped students approach problems with a similar structure and approach. Ben circulated through class to answer questions and clarify misconceptions while students completed mathematical problems.

When there was not one correct answer or way to approach a problem, instructors in my study created opportunities for students to have choices in how they approached a project or assignment. Bjorn's group assignment allowed students to synthesize course concepts as they chose and incorporated one model that had been discussed in the course. Bjorn created the group assignment because he recognized the difficulty students had in moving from applying a formula in class to generating a report and recommendations in a real-world situation after graduation. The group assignment allowed students to choose a model, work with real-world data, write a report for people who may not understand statistics, and give a presentation. Students gave a class presentation before submitting the final report to allow them time to incorporate feedback, questions, and new insights that arose during the presentation.

Ben's students solved a real-world problem before he presented course concepts. He believed this helped students develop some intuition around mathematical models and understand the context of theories and the methodologies. Ben's process of using a real-word

problem to provide some context or activate prior knowledge and Bjorn's suggestion that student presentations are a "work in progress" align with Ausubel (2000) and Schwartz and Bransford's (1998) "time for telling" (p. 476).

Ben, Bjorn, Helen, Halina, and Haley indicated students attended laboratories to practice skills required to learn course concepts. Ben and Bjorn stated students learned how to use applications like spreadsheets. Helen, Halina, and Haley said students learned health related or clinical skills. Laboratories were taught by instructors other than those who participated in my study.

Simulations used by Brent and Haley allowed students to work collaboratively with classmates, receive intrinsic feedback through the simulation, and modify their actions. Brandon's students worked individually with computer simulations to learn applications such as word processing, spreadsheets, and digital presentations. Comparison of simulations to the literature is included under learning technologies in this chapter.

Biggs and Tang (2011) wrote workplace learning helps students apply knowledge and skills, work collaboratively, and practice attitudes and responsibility in respective professions. Halina emphasized worksite placement provided opportunities for students to practice psychomotor skills, critical thinking, and acting in the role of a professional. Halina's availability to students and her supervision helped students to develop professional skills in a way that was supportive for students and safe for clients. Bruner (2006) emphasized that learning should not be separated from the context of action. Discovery learning, or learning through action, in most learning situations does not lead to the discovery of knowledge that does not currently exist. Guided discovery by teachers relies on a "well prepared mind" (Bruner, 2006, p. 58) and helps students to learn "to acquire information in a

way that makes that information more readily viable in problem solving" (Bruner, 2006, p. 60).

Reflection and Adaptation

Laurillard (2009, 2013) emphasized the connection between the discursive and experiential levels of the Conversational Framework for both students and instructors. Students reflect on practice and adapt understandings as they receive intrinsic and extrinsic feedback on their actions. Instructors reflect on their own and their students' performances to improve the explanation of concepts or the practice environments they provide for students. Laurillard's reflection and adaptation cycle is similar to Kolb's learning cycle (Kolb, 1984) of experiencing, reflecting, thinking, and actions (Kolb & Kolb, 2005).

Student reflection and adaptation. Feedback is essential for students to be able to adjust their conceptual understandings. Laurillard (2009, 2013) differentiated between intrinsic and extrinsic feedback. Intrinsic feedback is inherent to the student's action. For example, Papert's Turtle (1980) required students to write computer programs that would cause the turtle to draw a geometric shape. If the turtle did not draw the correct shape, students received intrinsic feedback because they could see what they needed to do to correct their understanding and action. Feedback from a teacher can also be intrinsic when it is both formative and summative and is provided within the context of the action so that students know how they can improve. Conversely, extrinsic feedback provides an evaluation of an action and is external to the action. For example, when students receive a right or wrong response, they do not know why they might be correct or incorrect and what they need to do to improve.

Gagné et al. (2005) wrote that providing feedback is a required part of the learning event, and is Gagné's seventh event of instruction. Similar to Laurillard's concept of intrinsic feedback, the Gagné et al. (2005) indicated feedback can sometimes be provided by the task itself. The authors used the example of throwing darts to illustrate how individuals could see how far the dart landed from the bull's eye and would then be able to modify their action. Gagné et al. (2005) acknowledged many types of formal learning do not provide, what they called, automatic feedback and suggested teachers not only indicate the correctness of students' performances, but also how students can change or improve performance. Tied to this is the eighth event of instruction, assessing performance." The teacher must ensure students have successfully completed a task because learning has occurred and not because they have simply guessed or completed a task by chance. The task should also be created in a way that actually measures achievement of the learning objective.

Instructors in my study ensured students received feedback to help students improve conceptual understandings. Online practice quizzes, often from publisher resources, provided extrinsic feedback on the questions students got correct or incorrect. Brent provided generic information explaining why answers were correct or incorrect. Instructors developed assignments to help students work through concepts. Ben posted detailed solution sets in the LMS for students to compare their approach, solution, and answers. Bill and Harmony tried to provide extrinsic feedback in a way that would help students know how they needed to improve. Brent and Bjorn required student groups to present projects to the instructor and classmates as a way to help students articulate their understandings and receive feedback. Bill used individual student presentations for similar reasons. Halina and Haley described the importance of providing space for reflection after worksite or simulation experiences.

Although instructors provided feedback to students, they did not always know if students used the feedback to reflect on and adapt their conceptual understandings. Bill included comments in the feedback indicating he found something in students' assignments interesting and asking them to come talk about it during office hours. When students approached him, he knew they had read his comments. Bill also began using the LMS to provide feedback on papers when he noticed students threw hard copies in the recycle bin after seeing their grades. Bill believed students might keep and review assignments if they had electronic copies. Harmony's students stated they did not use feedback, even though Harmony tried to provide comments that would help students with future activities in her course and in subsequent courses. Bjorn had student groups present their projects two weeks before their reports were due so students were able to incorporate feedback from the instructor and their classmates. Bjorn explicitly told students this was the opportunity to adjust their thinking and improve their reports. Halina actively questioned students about client care and provided immediate feedback so students could modify their understanding and act correctly to ensure client safety.

Intrinsic feedback was provided by simulations. Students were able to see the results of their actions, how far they were from their goals, and what they needed to do to modify their action. Brandon believed in mastery learning where students received feedback from the simulation and were able to try again to improve their knowledge of the tools and their grade. Brandon acknowledged his course focused on the use of tools, such as spreadsheets, word processing, and digital presentations, and not concepts requiring the use of tools. Brent and Haley emphasized the importance of the debriefing session after a simulation event to formalize the reflection and adaptation process.

The literature examined how students use feedback and what feedback they find most useful (Heppleston & Chikwa, 2014; Hepplestone et al., 2011). However, beyond the formalized structure of debriefing used in simulation (Brindley et al., 2007), there is limited research on whether instructors check whether students use feedback to reflect upon and adapt their understandings. Additionally, the learning technologies used by instructors did not provide information on whether feedback was being accessed or used by students. Without knowing when and how students use feedback, instructors may not know whether the feedback they provide is in a format or contains information that is useful for their students. If students do not reflect on how well they have succeeded in achieving a goal, they may not adjust their actions or conceptions.

Instructor reflection and adaptation. Teaching perspectives, or conceptions, come from beliefs about what "good teaching" means (Pratt et al., 2019, p. 238). Teaching conceptions develop over a career and reflection can help "faculty to examine, and if desired, transform their frames of reference to build new pedagogical understandings and strategies" (Maggio et al., 2018, p. 1133). Reflection on teaching and adaptation of practice allows teachers to improve "their own articulation of the theory or concept" (Laurillard, 2009, p. 8).

Hanson and Bjorn reviewed their digital presentations to ensure key concepts were presented clearly to students. Hanson recognized the "tweaking [he] seemed to do every year" when preparing his digital presentations and planning for his synchronous sessions. Bjorn also reviewed and made changes to his digital presentation slides each year. "Every year I really scrutinize my work and sparse slides" (Bjorn). Helen sent a survey to students each year, asking whether particular learning technologies were beneficial for their learning.

Bill explained he made a "pivotal switch," moving from a focus on teaching to learning after teaching for approximately 10 years. Brandon indicated it was not until after he had experience teaching that he began to examine ways to change the instructional strategies he used in his teaching. Similarly, after teaching a course, Bjorn examined ways to create a group assignment that embodied many of the concepts and learning goals. Hanson taught a course for five years before creating "skeleton notes" as a way to decrease students' note-taking to allow more class discussion of concepts. Harmony reflected and adapted through "trial and error," noting when certain strategies did not work for her or her students. Although this is not an unexpected finding, instructors tended to learn through their experiences of teaching rather than through professional development or mentoring.

Bill and Hope reflected on their experiences as students when deciding upon instructional strategies. Bill had struggled understanding the relationship among concepts in a course he had taken. Hope did not find it helpful when she was referred back to course materials to clarify her understanding of concepts.

As illustrated in Laurillard's (2009, 2013) Conversational Framework, learning in a post-secondary environment is complex. Table 6 shows the instructional strategies used by instructors in my study and how they fit within the Conversational Framework.

Table 6

Instructional Strategies and Laurillard's Conversational Framework

Teacher's conception	Learning outcomes Verbal presentation Reading
Student's conception	Ask questions Problem solving Concept maps Drill and practice Classroom assessment techniques

	Socratic questioning Assignments and examinations
Student's conception through discussion with peers	Discussion Case studies
Student's conception as practice	Problem solving Laboratories Worksite learning
Student's conception through collaboration	Group assignments

Learning Technologies

The Conversational Framework provides a way to evaluate whether a particular learning technology has all of the components required for learning. Laurillard (2013) acknowledged instructors can combine different learning technologies and strategies to ensure all components of the Conversational Framework required for learning are included for students. Three types of media, as described by Laurillard, align with the discursive level of her framework, narrative, interactive, and communicative. Two types of media align with the experiential level of her framework, adaptive and productive.

The instructors in my study tended to use similar learning technologies, perhaps choosing what was available at the university. Although I refer to digital presentation tools, instructors used PowerPoint. Learning technologies like Canva, Prezi, Google Slides, or HaikuDeck provide different ways to display and view content which could affect both teacher and student conceptualizations. Similarly, use of student response systems was limited to Poll Everywhere (Bill) and iClickers (Ben) and did not include Socrative, Kahoot, or Mentimeter. Again, opportunities to check student understanding could change with the use of different learning technologies. Instructors did not use virtual or augmented reality. It

should be acknowledged that different learning technologies have different impacts on learning outcomes, instructor and student receptiveness, and approaches to teaching and learning (Pelletier et al., 2021).

Narrative Media

Laurillard (2013) described narrative media as learning technologies used for presentations offering descriptions of the teacher's conception. Laurillard recognized if media is available to students and can be controlled by students, there could be a benefit to students. For example, if students have access to a digital presentation or video, they can decide on the pace at which to proceed through material, skip material, or further investigate concepts. This benefit is not available if students are watching a digital presentation or video that is controlled by a teacher in a classroom.

Digital presentation tools. Digital presentation tools (e.g., Microsoft PowerPoint, Google Slides) were initially designed for business or corporate purposes and have since been adopted by teachers as a way to present materials to students (Laurillard, 2013). Digital presentations are a narrative media because there is no interaction with the user beyond moving to the next presentation slide. Instructors in my study incorporated text and images, links to websites, and media into their digital presentations interactive. If presentations are available to students to watch, they could be interactive. Students might click on links to websites, view media, or navigation through different slides and topics.

Educational use of digital presentation tools seems to be taken for granted and is rarely evaluated (Adams, 2006; Laurillard, 2013; Nowak et al., 2016). Adams described the options users, including teachers, are presented with when they first begin to create a digital presentation. Teachers are guided to "click to add title" and "click to add text" (Adams, 2006,

p. 392) which can encourage teachers to organize material in a certain way. Adams explained the linear organization of a digital presentation can hamper dialogue by trying to organize material and questions in a particular order. Harmony expressed her concerns that "if you get married to [digital presentation tools] as a way to deliver knowledge and you're very adamant about getting through your slides, then I think it becomes a barrier to having those active discussions."

Nowak et al. (2016) noted students have a negative reaction to digital presentations overloaded with text, detailed explanations, charts, and graphs. The authors suggested criteria for constructing visually appealing digital presentations to engage students and help them explore complex course concepts. Hanson and Bjorn both indicated they revised their slides multiple times, ensuring that slides contained "key points" or "bare bones" students could use in conjunction with skeleton notes. Bjorn emphasized the importance of using slides to make key concepts clear to students. Helen made her digital presentations available to students after receiving requests from students.

Despite the limitations of digital presentation tools, Adams (2006) wrote they provide the ability to digitize text or images to which teachers can "point" (p. 398). Helen emphasized, while she did not like digital presentation tools, she did find the benefit of including graphics or animations to show to students. Adams also noted students used digital presentations as a guide to study for exams. She cautioned instructors about the effect of students believing if "it isn't on the [digital presentation], it probably isn't important" (p. 398). Hanson created digital presentations to "free up" student time for discussion. Before providing digital presentations and his notes to students, Hanson found "they would write every little thing down that I said." Helen embedded questions within her digital

presentations for discussion in class or for students to reflect upon. Bjorn ensured only material discussed in class was included on the digital presentation so students would have an accurate record of concepts. Instructors in the study described two general reasons to use digital presentations in their teaching. The first was to help instructors organize materials they would present to students. The second was to provide students with an outline of materials, including visual presentations such as graphics.

Video. Instructors in my study narrated digital presentations as a way to capture or record their lectures and make them available to students. Although student satisfaction over this delivery mode is generally positive, there has been little exploration of the pedagogical benefit or the difference between a face-to-face and recorded lecture (Hood & Lander, 2016; McNally et al., 2017). The limitations of digital presentation tools, as previously discussed, remain when narrations are added. Students are able to pause and re-watch the lectures but there is no opportunity to ask questions or engage in dialogue. Harmony and Brandon stated students with English as an additional language might benefit from being able to stop and re-watch narrated presentations. Brandon began incorporating captioning to further help students learn the terminology within the course or to identify any slang he may have used. Ben created a narrated presentation to explain assignments as a way to decrease the administrative type questions he received from students.

Providing students access to a recorded lecture frees up classroom time for discussion or active learning. However, simply providing a lecture in a different format does not necessarily indicate a redesign of teaching and learning (Hood & Lander, 2016; McNally et al., 2017). McNally et al. suggested students should be provided an orientation to how students are expected to engage with a recorded lecture and then with activities within the

classroom space. This was seen as especially important when success of such a model appeared to be contingent on student perceptions and satisfaction. Brad said his students liked his recorded lectures and the opportunity to watch them at home rather than coming to class. However, he found students did not seem to have the same conceptual understanding required to engage in class discussions as when he provided an in-class lecture. Although Brad did not know why this was the case, it may have been related to students' inability to ask clarifying questions when they watched the recorded lecture. Or it may have been related to students not knowing how to engage with a recorded lecture.

Laurillard (2013) included video within the category of narrative media. She stressed, although video is often referred to as interactive media, there is nothing that changes in a video when students watch it. Students can pause, stop, and rewind a video, and in this way control a video. Harmony, Hope, Helen, Ben, and Brad used existing videos to give students additional ways to see or hear an explanation of the course concepts. Existing videos were found on sites like YouTube or from publisher resources. Ben showed a video of a warehouse to give context to learning for those students who had never seen a warehouse.

Digital textbook materials. Digital textbook materials provide students with access to diverse learning materials, including text, coloured graphics, and media. Digital textbook materials can address issues of accessibility by incorporating glossaries and text-to-speech applications (Joseph, 2015).

Helen and Bjorn expected students to use publisher resources available with the purchase of the textbook. "They have study resources online …. They've got interactive case studies … sometimes they've got some video [and] animations that are available too." (Helen). Helen encouraged students to access publisher resources to receive explanations

about a concept in a way that was different from how she might explain a concept. Helen was unsure of how many students accessed the additional resources. Bjorn "customized a lot of the content" in the digital textbook used by students by adding text-based comments or video to "enhance student learning". Digital textbook materials could be narrative or interactive, depending on the level of control that students have when using them and whether there is an opportunity to navigate to different topics or items.

Interactive Media

Interactive media can be controlled by students (Laurillard, 2013). Web-based resources with hypertext, linked images, or multimedia allow students to navigate through different resources and perhaps view different perspectives on a topic. Although Laurillard noted the benefit of focused, goal-oriented gathering of information, interactive media does not respond to student questions nor provide a way for students to receive guidance or hints related to their understanding of course concepts.

All instructors, except Brandon, indicated they included web sites as resources for students to explore. The web sites provided background information to stimulate prior knowledge (Ausubel, 2000) and provided additional information about course concepts.

Communicative Media

Communicative media include learning technologies that facilitate discussion among students and the instructor (Laurillard, 2013). The role of a teacher is to establish ground rules, guide discussion, and clarify concepts. Email is an asynchronous communication tool and although instructors in my study indicated students frequently used email to clarify conceptions, it does not seem to be included in the literature as a learning technology. Instructors also used announcements for one-way communication with students. Because

announcements were used for administrative information, such as tasks to complete before the next class (Bill), announcements are included in a later section under learning management systems. Online discussions, student response systems, and synchronous conferencing are included as communicative media.

Online discussions. Asynchronous communication technologies, such as online conferences, discussions, or forums, allow students to think about a topic before composing a message for posting and may be beneficial for complex topics. Students who are not comfortable asking questions in class, may be more comfortable in an environment where they can take the time they need to draft a posting (Garrison & Vaughan, 2008; Laurillard, 2009). Although some discussion forums provide tools to record verbal responses, instructors in my study used text-based discussions.

When students are required to discuss ideas with classmates through written responses, "reflection and precision of expression" is required (Garrison & Kanuka, 2004, p. 97). Although in-person class discussions can be fast-paced and spontaneous, online discussions allow students time to consider complex topics and respond in their own time (Garrison & Kanuka, 2004; Garrison et al., 2000). The teacher models behaviours, responds to student posts, facilitates discourse by identifying areas of agreement and disagreement, and manages the progression of discussion (Anderson et al., 2001).

All instructors in my study, except Brandon and Halina, made use of online discussions within the LMS. Bill and Hanson created online discussions for students to ask questions about course concepts or to look for answers to frequently asked questions. Bill and Brad used online discussions as another way for students to articulate their understandings. For topics that might require time for reflection before students could

formulate a response, Harmony created online discussions. Hope used discussions as a way for students to share ideas in an online course and modelled the types of comments she expected of students. Before asking students to complete an online discussion activity, Bill had students complete a practice activity in class. He did this to ensure students would know how to participate, both in terms of using the technology and what they were expected to post.

Although there is a wealth of research into the benefits of online discussions, there may also be constraints. Students are unable to judge facial cues and may experience delays in responses from classmates. Students may be reluctant to trust ideas of peers and prefer instructor feedback and answers (Koehler et al., 2020). Instructors need to ensure the problem is well-defined and the online discussions are well-designed for students to benefit (Garrison et al., 2000; Koehler et al., 2020).

Brad found the quality of student postings in online discussions decreased throughout the course. Through a student survey, Helen determined students did not find online discussions beneficial to their learning.

Student response systems (SRS). Student response systems are included under communicative media because they provide a way for instructors to facilitate communication from students about students' understanding of course concepts. Benson et al. (2016) explained SRS allow students to answer questions using a wireless device and then responses are gathered and displayed for the instructor and students. According to the authors, students indicated the SRS helped them remain engaged during lectures, check understanding of concepts, and prepare for exams. However, students complained of some technological problems either related to the SRS devices or the instructors' technological knowledge. Ben

used a SRS once or twice during the semester to help students, and him, check their understanding of course concepts. Ben included an option of "hey instructor, I don't know what's going on at all," to help students feel comfortable indicating when they did not understand topics. This also prevented Ben from falsely believing students had an understanding of concepts if they had guessed correctly. Ben decreased his use of the SRS because the system could be cumbersome to bring devices to class and ensure batteries were working. He also worried about using class time to review multiple topics.

Bill adopted an online SRS to which students could connect and respond using their own mobile devices. Bill used the SRS to create survey data, from his students, to use in an analysis. Bill found students were more engaged in discussions around data they created than generic data from a textbook or Bill's own example. The SRS was not used to check student conceptions.

Synchronous conferencing. Synchronous communication technologies, such as web conferencing systems, are those in which students and the instructor log on at the same time. Synchronous communication technologies allow students to ask questions immediately; therefore, there is no delay in clarifying concepts. Politis and Politis (2016) acknowledged the benefit of synchronous conferencing tools in facilitating collaboration between the teacher and student and among students. However, the knowledge and skills of a teacher, as well as the motivation and preparation of students to use a synchronous conferencing tool affects the effectiveness for teaching (Politis & Politis, 2016). Hanson purposefully chose a synchronous conferencing tool after having gained experience by teaching the course in a traditional face-to-face lecture. He had knowledge of the course concepts and was interested in trying an online, synchronous conferencing tool to provide flexibility to students. Hanson

provided an orientation to students, including information on the equipment, such as a microphone and headset, students would require. Hanson conducted the lecture in a physical classroom so students who did not feel comfortable attending a synchronous online session could still attend a face-to-face class. Students who did not have high-speed Internet at home could go to a classmate's home or to the university. Although Hanson used an interactive learning technology to teach his course, the actual presentation of concepts was similar to a verbal classroom presentation with a digital presentation.

Similar to in-person lectures, a synchronous online tool allows students to ask questions and clarify course concepts without the delay asynchronous tools have. Instructors also have the ability to immediately assess whether student participation indicates understanding or misconceptions about the course concepts. For synchronous sessions to be successful, instructors must create an environment for students to engage (Politis & Politis, 2016). Hanson expected students to participate during the synchronous session to articulate their understanding and ask questions. He noted some students preferred participating in a face-to-face classroom, some students preferred using the audio tools in the synchronous session, and some students preferred using the text-based chat feature. Hanson found by "not being just the sage on the stage … by being human and having a sense of humour" created an environment in which students felt comfortable participating.

Adaptive Media

Adaptive media are usually computer-based media that change in response to students' actions. Depending on the computer program, there can be an opportunity for intrinsic feedback and students can see how close they are to achieving a goal and how they

need to change their action. However, some adaptive media only offer judgements on students' actions, providing comments such as "very good" or "try again."

Online quizzes. Frequent quizzes help students keep up with course materials, increase the chances of students completing course readings, reduce the importance of each single test, and help students prepare for exams (Weinstein & Wu, 2009). Ben, Brent, Bjorn, Brad, and Helen used practice quizzes from publishers in their courses. However, Ben and Brent noted the questions were limited by the level of questioning, were mainly knowledge based, and simply indicated whether students had read the textbook or not. Ben and Brent created more complex questions and activities to help students learn concepts and to assess students' understanding of concepts. The online quizzes provided extrinsic feedback by indicating whether students answered correctly and what the correct answer was. Brent's students received a grade upon completion of the textbook quizzes and could review the correct answers after the due date. This was done to prevent students from sharing answers. Thomas et al. (2020) wrote frequent quizzes enhance knowledge of previously learned material and resulted in better performance on new multiple-choice questions. The authors also stated allowing students to collaborate on quizzes reduced anxiety and resulted in better individual performance. However, as Ben and Brent noted, quiz questions should be at the level required for learning course concepts and should align with future assessments.

Simulations. Laurillard (2013) described computer-based simulations as adaptive media because the computer program responds or adapts based on students' actions. Students enter input, run the model, and receive a set of results which can be displayed as numbers, diagrams, or verbal descriptions. Adaptive media provide intrinsic feedback on students'

actions. Students are able to directly experience concepts rather than relying on a teacher's description of experience.

Cadotte (2016) wrote, through computer-based simulations, students are able to engage in practice to develop specific skills. The author described computer-based simulations used in business education as an iterative learning process whereby students make decisions, examine the result of their decisions, and modify their knowledge-base and actions. This is similar to Laurillard's reflection and adaptation cycle. Students reflect on the results of their practice task and adapt their conceptual understandings and their actions. Kolb and Kolb (2005) described experiential learning as when students go through a cycle of experiencing, reflecting, thinking and action. Cadotte (2016) described the role of the instructor as that of coach, helping students understand the parameters of the simulation, options for decisions and action, and the implications of their choices. Brent described his role of coach as questioning students to guide them to items in the analysis component of computer-based simulations. Brandon recognized using simulations meant that he was no longer the centre of the class and he had to move from being the "sage on the stage." Beuk (2016) wrote, although students found sales simulation games to be more fun than alternative teaching methods, such as lectures and case studies, students did not find the simulation games more useful than the lectures or case studies. Brent felt student presentations, combined with questions and answers from classmates, were required to complete the learning process. Without reflection, Brent questioned the benefit of the simulation activity for student learning.

Productive Media

Productive media allow students to produce something. Although Laurillard (2013) acknowledged students use a variety of electronic media, such as word processing, digital presentation, or illustrative programs, she suggested they are too generic to determine how effective the media are in helping students meet specific learning outcomes. Laurillard described Logo, Papert's (1980) programming language for geometry, as an example of productive media. Using Logo, students created and produced geometric shapes and received intrinsic feedback on their actions. I have included high-fidelity simulation under productive media because of the advanced nature of the technology, the intrinsic feedback provided to students, and student's performance as professionals during a high-fidelity simulation. High-fidelity simulation aligns more closely with Laurillard's (2013) description of productive media where students are able to act outside of the parameters of a computer-based simulation.

According to Brindley et al., (2007) high-fidelity simulation makes use of mannequins that mimic functions such as breathing, talking, and heart sounds to create a realistic setting. The purpose of high-fidelity simulation use in health care education is to ensure students have the opportunity to experience high-acuity patients and are able to learn through their mistakes in an environment that does not threaten patient safety (Brindley et al, 2007; Reid-Searl et al., 2011). Brindley et al. (2007) emphasized simulation involves the whole experience around a simulation event and should not be limited to the technology of the simulator (i.e. a computer or mannequin). According to Brindley et al., (2007) students must suspend disbelief and immerse themselves in the event.

Haley outlined the defined process of simulation, based upon research in the field. She emphasized the need for students to have a safe practice environment to learn through their mistakes. The learning occurs, not only during the simulation event, but more importantly during the debriefing session. Because the debriefing portion of simulation is so important, it requires instructors who have received training and who are experts in giving feedback (Brindley et al., 2007; Rudolph et al., 2008). Feedback must be provided in a way to prevent humiliation or a reluctance to ask questions about future areas of confusion. Rudolph et al. (2008) described questioning by the instructor as approaching a puzzle, asking students to help them understand certain actions. "Mistakes are puzzles to be learned from rather than crimes to be covered up" (Rudolph et al., 2008, p. 52). Students need to be challenged yet feel psychologically safe to engage in rigorous reflection which is meant to help students engage in ongoing reflective practice to challenge assumptions and professional practice (Rudolph et al., 2008; Schon, 1983).

Table 7 shows the learning technologies used by instructors in my study and how they fit within the Conversational Framework.

Table 7

Learning Technologies and Laurillard's Conversational Framework

Teacher's conception	Digital presentation tools Video Digital textbook materials Websites Synchronous conferencing
Student's conception	Online quizzes Student response systems Audio and text chat within synchronous conferencing
Student's conception through discussion with peers	Online discussions

Student's conception as practice	Individual simulations
Collaboration	Group simulation High-fidelity simulation

The Learning Management System

Coates et al. (2005) described four functions of a LMS: synchronous and synchronous communication; content development and delivery, including use as an object repository; formative and summative assessment with test submission and feedback; and, class and user management. Communication and assessments were discussed under communicative and adaptive media. This section will include the use of the LMS for content delivery and class management.

An LMS provides the opportunity of being interactive, similar to the way that a webpage is interactive. Students navigate the LMS, deciding what links to click on and what items to look at. An LMS has become an essential part of teaching and is used to support teaching activities, share content, or push information to students (Altinpulluk & Kesim, 2021; Bernardo & Duarte, 2020). Pomerantz et al. (2018) found faculty were most satisfied with administrative or course management functions such as sharing course documents and syllabi, pushing out and collecting assignments, and posting grades. Instructors in my study referred to the LMS as a one-stop shop where students and instructors could post and access all materials related to a course. Instructors used the LMS as a way to disseminate information to students. Hope used the LMS as the sole method of delivering an online course to students. Instructors most commonly posted materials such as digital presentations, notes, and PDF documents so they were easily accessible to students. Instructors also used

announcement tools to guide students or provide administrative information, such as Bill reminding students to prepare for the next class by completing assigned readings.

According to Kaewsaiha and Chanchalor (2021), instructors are most likely to use the LMS based upon recommendations from their peers. Although instructors in my study were identified as leaders in the use of learning technologies by their colleagues, Bjorn and Bill acknowledged they had not learned some of the features of the new LMS. Bjorn was unable to draw questions from a larger test bank as he had with the previous LMS but found other ways to create quizzes or tests. Bill was unable to display discussion forums the way he liked, although this may have been a limitation of the LMS.

"LMS are not pedagogically neutral technologies, but rather, through their very design, they influence and guide teaching. As the systems become more incorporated into everyday academic practices, they will work to shape and even define teachers' imaginations, expectations and behaviours" (Coates et al., 2005, p. 27). Bill struggled with the linear organization within the LMS as he attempted to create a course that allowed students the freedom to discover course concepts rather than requiring them to move through content sequentially. Halina didn't find the LMS intuitive and created online collaborative documents, which she found easier to use, to communicate competency-based assessments with students.

Bill, Ben, and Bjorn created group assignments where students worked together to complete a task. Bjorn required students to use the LMS exclusively for document management and communication that did not occur in person. This was done to ensure all group members had access to all documents. Ben required group communication and an interim submission to occur in the LMS so he could see who was contributing to the group,

who may need follow-up, and groups that might need assistance. Although Bill set up a group area for required submissions and postings, his students tended to use an online application outside of the LMS to collaborate on shared documents. Although group management is not an instructional strategy or media, class and user management is described in the literature as a function of the LMS (Kaewsaiha & Chanchalor, 2021; Kant et al., 2021).

Instructors in my study mentioned the LMS as an important learning technology for their teaching and learning. Analyzing the LMS from the perspective of Laurillard's Conversational Framework raises questions as to whether the LMS, as a whole, should be considered a learning technology. Because of the emphasis on the LMS as being able to help teachers organize and manage student learning, it appears learning technologies within the LMS should be considered separately. For example, discussions should be analyzed in relation to the literature and experiences of online discussions and not the LMS.

Learning How to Learn with Technology

Galanek and Brooks (2019) wrote students wanted to receive training and support on using their university's technology. Similar to the way instructors in my study ensured students were prepared for learning concepts, instructors also ensured their students were able to learn with technology. Bill asked students to complete online discussions in class to explain expectations and ensure students could use the technology. Hanson provided suggestions to students about the equipment needed to participate in synchronous conferences. His first classes were conducted in person so he could provide an orientation to the tools and discuss how students would participate during the synchronous sessions.

Hanson created an open synchronous conference for students to access during the first week of class to test their equipment.

Brent explained he did not just prepare students for the technology of the simulation, but he also prepared them for the knowledge and skills they would be required to be successful. Brent created active learning activities in class to allow his students to practice working in groups and to help them choose classmates for the simulation. He also reviewed topics from previous courses so students had the knowledge required to make decisions during the simulation.

Learning-Centred Education

One of the goals of my study was to explore learning-centred education within the context of Laurillard's Conversational Framework. Laurillard (2009) created her Conversational Framework by turning to learning theories and "what it takes to learn in the context of formal education" (p. 7). Instructors in my study integrated numerous instructional strategies and learning technologies into their teaching. They made decisions about what students were required to do within a particular course or program of study. Often instructors made decisions before a course started. They chose strategies and developed content presentation, learning activities, and assessments by considering the needs of former students. The majority of Helen and Hanson's students came directly from high school and required guidance on how to approach the content and use the tools provided. Hope indicated students in her online course were mature learners who needed to be explicitly told they were being assessed on the process of online discussions more than the content of their postings.

Instructors in my study worked collaboratively with colleagues to make decisions about instructional strategies in their courses. Bjorn, Ben, and Helen communicated with

laboratory instructors about the topics within a laboratory or timing of content presentation. Brent collaborated with other instructors teaching within the academic program, and who taught the same course, to choose a computer-based simulation. The course and simulation acted as a capstone for the academic program. Haley acted as the go-to person to plan integration of simulation across the curriculum. Halina drew from resources provided to all instructors teaching worksite placements.

The instructors in my study also considered more individual learner-centred strategies. Ben used a hand-in assignment early in the term as a way to check student understanding and to learn students' names. Ben, Helen, Hope, and Harmony used different presentational strategies, incorporating verbal explanation, text, graphics, and video to meet different learner needs. Harmony provided some student choice for assessment types and topics. Helen, Hope, and Harmony specifically mentioned some students were visual learners. Although some learners seem to learn better when information is presented in a visual format, through diagrams or pictures, Pashler et al. (2009) argued there is no evidence indicating a benefit of a learning-styles approach to education. Instructors' use of images or graphics may align more closely with multimodal technologies (Laurillard, 2012).

While learner-centred strategies focus on the individual learners, learning-centred strategies focus on what it takes to learn, or create knowledge within a course or discipline. Kolb and Kolb (2005) described learning as a process. In the authors' explanation of experiential learning theory, they recognized that learning style is dynamic and students may change learning style preference depending on the course and tasks. The authors further explained students should not only understand their own learning style or "how they learn

best" (Kolb & Kolb, 2005, p. 209), but also how to learn in ways that may be uncomfortable or do not match their preferred learning style.

Instructors in my study used terms like engaging, interactive, real-world, and active learning. However, instructors also acknowledged when courses were challenging for students, either because of the content within the course or an intimidating learning environment, such as simulations or group projects. According to Mostrom and Blumberg (2012) learning-centred education involves shifting responsibility for learning to students, providing opportunities for active engagement, and designing formative assessment strategies. Mostrom and Blumberg cautioned that simply integrating active learning or hands-on activities does not lead to learning-centred education. Blumberg and Pontiggia (2011) expanded on Weimer's (2002) work to describe the function of content, role of the instructor, responsibility for learning, purposes and processes of assessment, and balance of power in a learning-centred approach to teaching. The authors indicated content should provide a knowledge base, encourage discipline-related thinking, and solve real-world problems. The instructor must align objectives, teaching and learning methods, and assessments. Students are guided to take responsibility for their learning when the instructor helps students learn how to learn by developing time management, goal setting, independent reading, and self-assessment skills. In addition to more traditional assessment processes, learning-centered instructors consider mastery learning as well as formative and peer assessments. Shifting the balance of power to students involves giving students choice over content and types of assessments and allowing alternative perspectives to be shared and discussed.

Biggs and Tang (2011) described the diversity of students in post-secondary education indicating some may not have the skills to independently determine what is

required to succeed. Ausubel (2000) wrote that students must have existing knowledge and cognitive structures to act as anchors for new material. However, the authors presented teaching and learning activities that focused on learning and not individual students. The literature and findings from my study suggest the best term within the context of formal education is learning-centred education.

Comparison of the Literature and Findings

This chapter presented the findings in relation to the literature. The main sections included learning in a post-secondary environment, learning technologies, and learning-centred education.

The literature described the need for students to take responsibility for their own learning in a learning-centred environment (Laurillard, 2013; Merriam & Bierema, 2013; Mostrom & Blumberg, 2012). Instructors in my study supported students to ensure students were able to take responsibility for their learning. Ben and Bill questioned whether students understood learning objectives. Ben created in-class activities for students to build intuition around course concepts. Ben believed that once students completed the activity, they would be able to understand what the learning objectives meant. Bill explicitly stated learning outcomes at the beginning of a lesson, when discussing content, and when completing in-class learning activities. He ensured students could self-assess whether they had met the learning objective or whether they needed to do additional work. Hanson developed, what he called, skeleton notes that listed learning outcomes in a format students could use during class and when studying. Having the skeleton notes during class provided students with the time to discuss concepts. While studying, students used the skeleton notes to self-assess whether they could answer the questions that might appear on the examinations. Bill and

Hanson also ensured students knew how to use learning technologies. In addition to providing an orientation to the learning technologies, they helped students practice activities, such as online discussions or participating in a synchronous conference, so students knew what was expected of them.

The term lecture was used broadly to include activities that occurred during an in-person class. Activities included instructor presentation, discussions, case studies, and group activities. Instructors used terms like active learning and engagement when describing the activities they included in their classes. Instructors compared the lecture component of the course to online, laboratory, or worksite placement components. The findings in my study differed from the literature which described a lecture as when an instructor is talking or presenting concepts to students (Gagé, 1985; Johnson & Barrett, 2017; Vaughan et al., 2013) and aligned with Biggs and Tang's (2011) description of the lecture as a learning situation.

Discussion about the importance of providing feedback to students is prevalent in the literature (Gagné et al., 2005: Heppleston & Chikwa, 2014: Kolb & Kolb, 2005; Laurillard, 2009, 2013). Laurillard (2013) contrasts intrinsic and extrinsic feedback. Simulation literature (Brindley et al., 2007; Rudoph et al, 2008) described the debriefing process as a way to provide feedback and to encourage student reflection. Despite agreement over the importance of feedback, there is little in the literature that describes ways for instructors to determine whether students found feedback helpful in their reflection and whether feedback caused changes in students' conceptual understandings. Bjorn and Bill attempted to manually create processes to help students use feedback and to determine whether students had used feedback. Bjorn asked students to give in-person presentations and incorporate classmate and instructor feedback in the written report. Bill provided comments on students' papers asking

them to come to talk to him about a topic in the papers that reminded Bill of an experience or additional information. When students came to talk to Bill, he had an indication of whether students were reading the feedback he provided. Although learning technologies, such as online discussions, quizzes, or digital assignments, allow instructors to enter feedback, limitations exist around instructors being able to easily determine if and how students are using the feedback.

The literature described multiple ways learning technologies could be used by instructors to help students understand difficult concepts (Benson et al., 2016; Hood & Lander, 2016; Joseph, 2015; McNally et al., 2017). However, Ben and Bjorn worked to reduce the information they provided to students about difficult concepts. Ben did not provide an intuition-building activity for one or two difficult concepts and rather focused on helping students use the formula. Bjorn worked to distill his presentation to key concepts.

Instructors in my study noted students may feel intimidated or anxious when approaching new learning situations. The literature on simulations recognizes the stressful environment, especially of high-fidelity simulation (Brindley et al., 2007; Reid-Searl et al., 2011; Rudolph et al., 2008) and the literature on learning-centred education discusses the power differential between instructors and students (Blumberg and Pontiggia, 2011; Weimer, 2002). However, there is little in the literature that explores instructors' feelings of vulnerability when instructors attempt to address students' feelings of intimidation. Brandon, Hanson, and Harmony mentioned their own feelings of vulnerability when they used learning technologies and created learning environments to support student learning.

An overview of findings in relation to the literature are presented in Table 8. The overview presents the findings, supporting literature, contracting literature, and findings not in the literature reviewed.

Table 8

Overview of Findings and the Literature

Findings	**Supporting Literature**	**Contradicting Literature**	**Not in the Literature Reviewed**
Instructors prepared students for learning.	Gagné, 1985 Gagné et al., 2005 Laurillard, 2013 Merriam & Bierema, 2013		Instructors sent introductory information to students before a course started (Helen)
Students must learn how to learn in a formal post-secondary environment.	Ausubel, 2000 Biggs & Tang, 2011 Gagné et al., 2005 Jansen & van der Meer, 2012 Johnson & Barrett, 2017 Laurillard, 2009, 2013 Lowe & Cook, 2003 Marton & Säljö, 1976b McAlpine, 2004 Merrill, 2002		
The term "lecture" included in-class learning activities such as discussions, case studies, or group tasks.	Biggs and Tang, 2011	Gagé, 1985 Johnson & Barrett, 2017 Vaughan et al., 2013	
Instructors provided feedback to support student learning	Gagné et al., 2005 Hepplestone et al., 2011		Instructors did not know whether students had

through reflection and adaptation.	Heppleston & Chikwa, 2014 Kolb & Kolb, 2005 Laurillard 2009, 2013		accessed or made use of feedback.
Instructors used a variety of instructional strategies to support student learning • Verbal presentation • Readings (textbook, scholarly articles) • Student asking questions • Problem solving • Concept maps • Drill and practice • CATs • Socratic questioning • Discussion • Case studies • Group assignments • Worksite learning	Ausubel, 2000 Biggs & Tang, 2011 Gagné et al., 2005 Laurillard, 2013 Vaughan et al., 2013 Gurung et al., 2012 Ausubel, 2000 Merrill, 2002 Bruner, 2006 Novak & Canas, 2015 Ausubel, 2000 Angelo & Cross, 1993 Toledo, 2015 Biggs & Tang, 2011 Penn et al., 2016 Biggs & Tang, 2011 Laurillard, 2013 Biggs & Tang, 2011		

Instructors used a variety of learning technologies to support student learning. • Digital presentation tools • Student response systems • Video and narrated presentations • Publisher resources • Synchronous conferencing • LMS • Simulations	Laurillard, 2013 Adams, 2006 Laurillard, 2013 Nowak et al., 2016 Benson et al., 2016 Hood & Lander, 2016 McNally et al., 2017 Gurung et al., 2012 Joseph, 2015 Politis & Politis, 2016 Bernardo & Duarte, 2020 Coates et al., 2005 Dahlstrom et al., 2014; Wasik, 2020 Beuk, 2016 Brindley et al., 2007 Cadotte, 2016 Reid-Searl et al., 2011 Rudolph, 2008 Garrison et al., 2000		Ben included a response that allowed students to indicate that they did not understand a concept. This prevented students from guessing a correct answer and Ben assuming they understood.

• Online discussions	Garrison & Kanuka, 2004 Koehler et al., 2020 Laurillard, 2009		
Learning technologies have become ubiquitous in post-secondary education; however, instructors must prepare students to use learning technologies.	Altinpulluk & Kesim, 2021 Laurillard, 2013		
Students may be anxious in new learning environments.	Brindley et al., 2007 Rudolph et al., 2008		Instructors felt vulnerable when moving from a role of lecturer.
Instructors reflected upon and adapted their instructional strategies. Through reflection, instructors changed their teaching conceptions	Kolb & Kolb, 2005 Laurillard, 2009, 2013 Maggio et al., 2018 Pratt et al., 2019		Instructors simplified difficult concepts, providing less information to students.

Chapter Summary

This chapter provided a summary of the findings in relation to the literature. Although the majority of findings were supported by the literature, my study has provided further insight to the instructional strategies and learning technologies instructors use to support student learning using Laurillard's Conversational Framework as a theoretical framework. My study builds upon Laurillard's Conversational Framework and teaching conceptions. An overview of the study, conclusions, recommendations, and final reflections are presented in the following chapter.

Overview of Study, Conclusions, Recommendations, and Final Reflections

The purpose of my research study was to explore the instructional strategies and learning technologies instructors used to support student learning in post-secondary institutions. Using Laurillard's Conversational Framework (2009, 2013) as a theoretical framework, my study focused not only on how instructional strategies and technologies were used, but also on the considerations made by instructors as they created opportunities for learning. Stated in the form of a question, the research was guided by the following: *What instructional strategies and learning technologies do instructors use to support student learning?* This chapter consists of the following sections (a) overview of the study, (b) research questions and conclusions, (c) learning-centred education (d) recommendations, and (e) final reflections.

Overview of the Study

There appears to be agreement that learning technologies have the potential to create teaching and learning innovations (Bernardo & Duarte, 2020; Garrison & Vaughan, 2008; Pelletier et al., 2021). The literature explored innovations related to learning technologies, such as learning management systems (Coates et al., 2005; Bernardo & Duarte, 2020; Dahlstrom et al., 2014; Wasik, 2020), online discussions (Garrison & Vaughan, 2008), mobile learning (Laurillard, 2009), digital presentations (Adams, 2006; Nowak et al., 2016), video (Hood & Lander, 2016; McNally et al., 2017), and simulations (Brindley et al., 2007; Cadotte, 2016; Rudolph et al., 2008).

Laurillard (2009) described her Conversational Framework as including "what it takes to learn in the context of formal education" (p. 7). Using Laurillard's Conversational

Framework as a theoretical framework for my study allowed exploration of the ways instructors used instructional strategies and learning technologies to support student learning.

Methodology

My personal ontology and epistemology influenced the direction of my study. I believe in a world that is "always 'already there' – before reflection begins" (Merleau-Ponty, 1945/1971, p. vii). Although the world always exists, it does not have meaning until we act purposefully in it and create meaning. Because I believe that there are multiple ways of being-in-the-world, I also believe that there are multiple ways of knowing. Knowledge is contextual and tentative. Knowledge, or meaning, can be individual or collective.

I used a generic qualitative research methodology in my study. According to Merriam (2009), generic qualitative research, also called basic or interpretive qualitative research, "attempts to understand how people make sense of their lives and their experiences" (p. 23). Purposeful sampling (Oliver, 2010) was used to select 12 post-secondary instructors who incorporated learning technologies into their teaching to support student learning.

Interviews obtained in-depth information about the experiences of instructors who taught at a university in Alberta. A semi-structured interview guide allowed me to collect comparable data from participants, engage in conversation, and explore new topics as they emerged during interviews. The interview guide was based on a checklist of questions for the Conversational Framework (Laurillard, 2009). I recorded and transcribed interviews to increase the accuracy and completeness of the data. Transcripts and descriptive summaries were shared with participants to check I had adequately captured their experiences and understandings. Descriptive summaries were provided to participants because they may not have had the time to review a complete transcript.

When I moved to data analysis and the development of concepts and categories, I consulted a colleague to provide feedback and challenge assumptions I have made. I included rich quotes to ground participants' comments in the context of my study (Williams & Morrow. 2009). A self-reflexive journal was used, not only to document decisions made during data collection and analysis, but also as a way to review and refine my research. Truth or knowledge was constructed by participants and me, as researcher, within the context of my study. The findings of my study may not be the same as findings constructed at a different time or place or with different participants.

Research Questions and Conclusions

The research design in my study provided rich data from which themes emerged. The themes provided answers to my main research question and my sub questions. This section includes a discussion of the responses to the research questions as well as conclusions drawn from the responses.

Sub-question 1: What explanatory and presentational strategies do instructors use to help students achieve understandings of course concepts?

Instructors in my study emphasized the need to prepare students for learning. This was accomplished by providing learning strategies to students before a course started, reminding students to complete readings and be able to answer questions for the next class, and beginning a class with an introductory activity to review previous concepts or introduce new concepts. Learning technologies such as email and push notifications were used by instructors to communicate with students outside of class time. Introductory activities included face-to-face discussions, synchronous online discussions, and presentation of video.

Instructors used learning objectives as a way to communicate concepts and expectations to students. Hanson and Bill designed their courses to lead students through learning objectives, course content, and learning activities in ways that allowed students to use learning objectives to self-assess their understanding of course concepts. Ben introduced new topics to students by asking them to complete a real-world activity as a way to build intuition. Ben, Bill, and Hanson believed students needed support to understand learning objectives and then take responsibility for their own learning.

All instructors in my study except Hope, who taught an online course, used face-to-face lectures to present course concepts to students. Instructors stressed their attempt to limit traditional lecture time to allow for more active learning activities during class. Instructors used the term lecture broadly to refer to in-class activities that were directed by the instructor and included active learning activities such as discussions, case studies, and group tasks.

All instructors used digital presentation tools to support the presentation of course concepts to students. Digital presentation tools were used to organize materials and to incorporate images, websites, and video into lectures. Bjorn, Harmony, and Hanson reviewed their digital presentations regularly and worked to distill slides down to the key concepts for students. Bill, Helen, Harmony, and Hope incorporated images, websites, and video as a way to present concepts to students in different ways. Helen and Hanson found that providing digital presentations to students allowed students to focus on the presentation and to participate in discussions because students were not focused on taking notes. Hanson used an online synchronous conferencing system to deliver lectures to students. Although he used an online tool, Hanson conducted the synchronous sessions from a classroom so students could

attend in-person if they felt more comfortable in a classroom or if they had limited network access.

Instructors created narrated digital presentations as video to explain concepts to students. Although Brad used video to create a blended course delivery model, most instructors created video as additional resources for students. Ben and Brandon used screen capture software to demonstrate how to complete certain activities, such as functions in a spreadsheet. Ben, Harmony, and Brandon emphasized the benefit for students to be able to watch the screen capture video multiple times, particularly those who might have English as an additional language. Hope used narrated digital presentations to present difficult processes, especially those that might be challenging to explain through text. Instructors integrated existing video to provide additional examples and explanations. Hope and Helen believed video provided variety to student learning and might address different learning styles. Harmony integrated video as a way to bring information or experiences into the classroom, as well as help students know that existing resources are available to support their practice.

> I will use technology as a way to bring some of those videos into the classroom ... [to] share, you know, content with somebody else. So I don't have to re-invent the wheel ... I told them that they have to relate it to their practice. So I've had some students take music therapy. They are really interested in music so they just need to relate it to their future practice. So they say they are interested in working with older populations so they might recognize that in terms of music, in terms of dementia, crossing those generational differences. (Harmony)

Publisher resources not only provided text-based explanations for students, but also included video and animations to help students understand course concepts. Helen and Bjorn described the rich resources available through the online textbook as a way to provide alternate presentations of course concepts. Bjorn noted the benefit of being able to add his own comments or insert resources to enhance student learning. Although Helen believed the publisher provided a variety of resources for students, she was not sure how many students accessed the resources.

The learning management system (LMS) was seen as a one-stop shop for both instructors and students. Publisher resources, materials shared by other instructors, and course materials were accessed through the LMS so students did not need to access a variety of systems or remember multiple passwords. Instructors posted and organized course materials intentionally to present course concepts to students in a way instructors felt supported student learning. Hope modified the default layout or navigation of the LMS and organized the tools students would need. Hope used the announcement tool in the LMS to remind students of upcoming due dates and how to proceed through the online course. Bjorn organized materials in the LMS for students as the semester progressed. By putting material up when students needed it, students were better able to find documents and resources. Bill grappled with the sequential organization of the LMS and his belief that students should have more freedom to discover topics in a non-sequential manner. Ben did not believe the current LMS has any features or tools that substantially improved his teaching over the previous LMS.

Sub-question 2: How do instructors check students' understandings of course concepts?

Instructors in my study expected students to ask questions if they did not understand course concepts. Instructors were available to answer questions in class, during office hours, and by email; however, the majority of students used email. Instructors also created structured opportunities for students to indicate when they did not understand course concepts. Ben, Brad, and Hanson asked students to complete muddiest-point activities to indicate the concepts students found most confusing or did not understand. Hanson created his muddiest-point activity as an anonymous discussion in the LMS. Bill created a frequently-asked-questions discussion area in the LMS where he posted administrative or process information, such as when an assignment was due. Hope also created a frequently-asked-questions discussion area where students asked questions and were encouraged to respond to each other as a way to articulate understandings.

Hanson used tools within the synchronous conferencing system to check students' understanding of concepts. He asked students to use the thumbs-up icon if they understood a particular concept. If students did not understand a concept, Hanson re-explained. Students also used the chat box to ask clarifying questions, which were answered by Hanson or other students.

Haley, Ben, Brent, Bjorn, and Brad created quizzes in the LMS to test student knowledge and to help students learn from misunderstandings. Feedback to students included correct answers, their response and whether it was correct, and sometimes generic feedback that explained the answer. However, instructors did not always know whether students used the feedback. Ben used a classroom response system to deliver quizzes to check whether students understand concepts and to provide additional explanation if needed. Bjorn and

Brent incorporated in-class presentations for the group assignments. The instructors believed students not only benefited from their feedback as instructors, but also from the feedback and questions from classmates. Haley followed a structured debriefing format after students completed a high-fidelity simulation to help students reflect on their decisions and allow Haley to see why errors were made.

Instructors used examinations to assess whether students understood course concepts. Hanson, Helen, and Hope provided examples of questions to students and helped students prepare for examinations. Hope and Bjorn reviewed examinations with students to ensure they understood concepts that would appear on the next examination or course.

Instructors in my study noted students needed a safe environment for learning so students would feel comfortable asking questions and participating in discussions. Hope, Helen, and Bjorn explicitly explained to students that questions were welcomed and would help everyone learn together. Harmony and Hanson recognized the power differential between instructors and students and worked to develop an environment of mutual respect, which they felt increased their vulnerability as instructors.

Sub-question 3: How do students engage in practice tasks to develop understandings of course concepts?

Instructors in my study created a variety of practice tasks to help students develop conceptual understandings. Ben, Brandon, and Bill asked students to complete in-class problem-solving activities and circulated through the classroom to check students' understanding and clarify misconceptions. Bjorn assigned textbook questions for students to complete at home and then reviewed common difficulties during class. Ben built student

intuition around course concepts by asking students to complete a real-life problem before they had received formal instruction on the topic.

Individual and group assignments were created to help students adapt and refine their conceptual understandings. Bjorn and Helen incorporated real-world data and tasks to help build student knowledge and skills that would be required after graduation. Instructors emphasized the importance of providing feedback to students. Bill broke assignments into sections to ensure students received feedback throughout an assignment. Harmony and Bjorn offered to provide feedback to students on the first paragraph or section of an assignment. Ben provided a comprehensive solution set to assignments, as well as providing individual feedback to students. Although instructors emphasized the importance of providing feedback to students, Bill and Harmony said students did not always read the feedback provided on individual papers and Ben was unsure how many students reviewed the comprehensive solution set.

Computer and high-fidelity simulation learning technologies were used by Haley, Brent, and Brandon. Laurillard (2013) described simulations as adaptive media responding to students' actions and thus providing intrinsic feedback to students. Brent and Haley used simulations to tie together the various theoretical concepts from students' courses and programs. Instructors said simulations provided opportunities to engage in real-world learning in a safe environment that could not be provided without the use of simulations. However, instructors also noted the anxiety students experienced when learning in an intimidating environment and developed mechanisms to decrease that anxiety. Brent and Haley did not provide answers when students had questions during the simulation, rather they provided cues or hints to help students make decisions. The two instructors also used a

formalized feedback or debriefing process to ensure students were able to reflect on their learning and change their ideas or behaviours.

Sub-question 4: What opportunities are provided for students to discuss concepts or collaborate with classmates?

Instructors used in-class and online discussions for students to articulate their understanding of a course concept and to allow instructors to clarify misconceptions. Students were also able to hear and learn from their classmates' perspectives. Helen created case study discussion questions to help students develop their thinking as practicing professionals. Bill and Brent incorporated small group discussion activities as a way for students to share their ideas with a classmate. Brent also used these activities for students to get to know each other before a large group assignment.

Before requiring students to participate in an online discussion outside of class time, Bill asked students to complete an online discussion during class. Bill used the in-class time to ensure students knew what was expected of them, both in terms of using the technology and what they were expected to post. In her online course, Hope emphasized the process of posting a response and replying to classmates so students would share ideas and learn from each other. Brad and Helen did not find online discussions to be beneficial to students' learning. Brad said the quality of students' postings decreased as the class progressed. Helen integrated asynchronous discussion forums in the LMS but, through a survey she sent to students, she found students did not find them beneficial to their learning.

Ben, Bjorn, and Brent designed group assignments during which students collaborated with team members. Bjorn and Brent incorporated in-class presentations for the group assignments which provided opportunities for feedback and new insights. All three

instructors used the LMS to manage group assignments. Haley emphasized the team or group environment of high-fidelity simulation.

Sub-question 5: How are learning technologies integrated to achieve teaching and learning goals?

Instructors used learning technologies to present content to students, help students check understanding, encourage students to articulate understandings in discussions with classmates, create and submit group and individual assignments, and participate in simulations. Instructors reflected on their use of learning technologies and made adaptations based on student requirements. Bjorn and Harmony reviewed their digital presentations and worked to distill slides down to the key concepts for students. Helen provided a survey to students to determine the types of learning technologies they found most beneficial to their learning.

Instructors said some learning technologies helped to achieve teaching and learning goals in ways that would not be possible without such technologies. Ben used screen capture programs to explain concepts or assignments so students could access materials outside of class time. He felt such programs have provided the biggest technological benefit to his teaching. Brandon was able to implement mastery learning by using publisher simulation resources. Students submitted simulation activities multiple times and received timely feedback on where they needed to improve. Hanson's use of a synchronous conferencing system meant that students did not need to travel to campus for the one class that was scheduled on Fridays. Hanson was also able to teach from another campus when his administrative duties required him to travel for meetings. Although Hanson recorded the sessions for students to review as wanted, Hanson said attendance in the live, online sessions

has not decreased. He believed attendance was actually higher in his online sessions than in some of his colleagues' traditional, face-to-face lectures.

The LMS was used as a one-stop-shop for both instructors and students. Although the LMS was viewed as both essential and ubiquitous by instructors in the study, they did not always find its use intuitive. Bjorn and Ben indicated they were not able to accomplish teaching goals in the current LMS as well as they had been able to do so in the previous LMS.

Providing feedback to students was essential for all instructors in my study and many used technological tools to provide feedback. Haley, Brent, and Ben used the LMS to deliver quizzes and provide students with correct answers and generic feedback. Bill used the assignment tool in the LMS to mark and return assignments to students, hoping students would access and revisit feedback. Ben posted detailed solution sets in the LMS. However, learning technologies did not have mechanisms to track or report student use of feedback and instructors did not always know if or how students used feedback.

Main research question: What instructional strategies and learning technologies do instructors use to support student learning?

Instructors in my study learned about teaching through educational degrees, courses and workshops, mentors, and individual reading. However, instructors emphasized their own teaching experiences have informed their decisions about instructional strategies and learning technologies. Hanson developed skeleton notes for students when he found they spent the class writing notes rather than engaging in discussion. He integrated research articles as an introduction to course topics after he had been teaching a course for five years in order to generate some interest with the students. Bjorn re-designed his course to include a group

assignment when he realized the workload for both students and instructors teaching the course was not manageable. Brandon indicated that, only through experience was he able to determine appropriate workload for students.

Instructors not only reflected on their own teaching but also worked with colleagues to make decisions about teaching and learning. Brent chose a simulation program and designed the capstone project in collaboration with colleagues. Halina used resources for students that were shared among instructors. Haley provided high-fidelity simulation expertise for courses within a program of study. Helen and Bjorn considered laboratory learning students completed during their courses to inform their decisions.

Using Laurillard's Conversational Framework (2009, 2013) as a theoretical framework allowed a broad exploration of the instructional strategies and learning technologies instructors in my study used to meet teaching and learning goals. Narrative learning technologies, such as digital presentations or videos were used to present concepts to students. Interactive learning technologies such as websites or publisher resources were used to present concepts in a way that allowed students to make choices about the topics they explored or how concepts were presented. Interactive learning technologies were used to provide background knowledge as well as new information. Email, online discussions, and synchronous conferencing sessions were used as communicative learning technologies to facilitate interaction between instructors and students and among students. Communicative learning technologies allowed students to articulate their understandings of course concepts and learn from other students. Adaptive media, such as computer simulations, and productive media, such as high-fidelity simulations, provided opportunities for real-world learning in which students received intrinsic feedback on their actions.

Instructors took an active role in ensuring students not only knew how to use a learning technology, but also knew how to learn when using a learning technology. Bill questioned whether students knew what was expected when they were asked to engage in online discussions. Brent provided active learning activities to review course concepts for a computer simulation and to help students get to know the classmates they would work with on the simulation project. Instructors in my study combined learning technologies and non-technological strategies to ensure students had the opportunities to engage in all of the activities and tasks required for learning in a formal, post-secondary environment.

Learning-Centred Education

Laurillard's Conversational Framework describes the requirements for learning in a formal post-secondary environment and acknowledges different learning theories and learning processes. It also provides a way to evaluate learning technologies in relation to the type of learning they support. A benefit of Laurillard's Conversational Framework is that it does not position one learning theory, instructional strategy, or learning technology over another. From the results from my study, I would suggest inclusion of additional components to create a more comprehensive framework for using learning technologies in learning-centred post-secondary education.

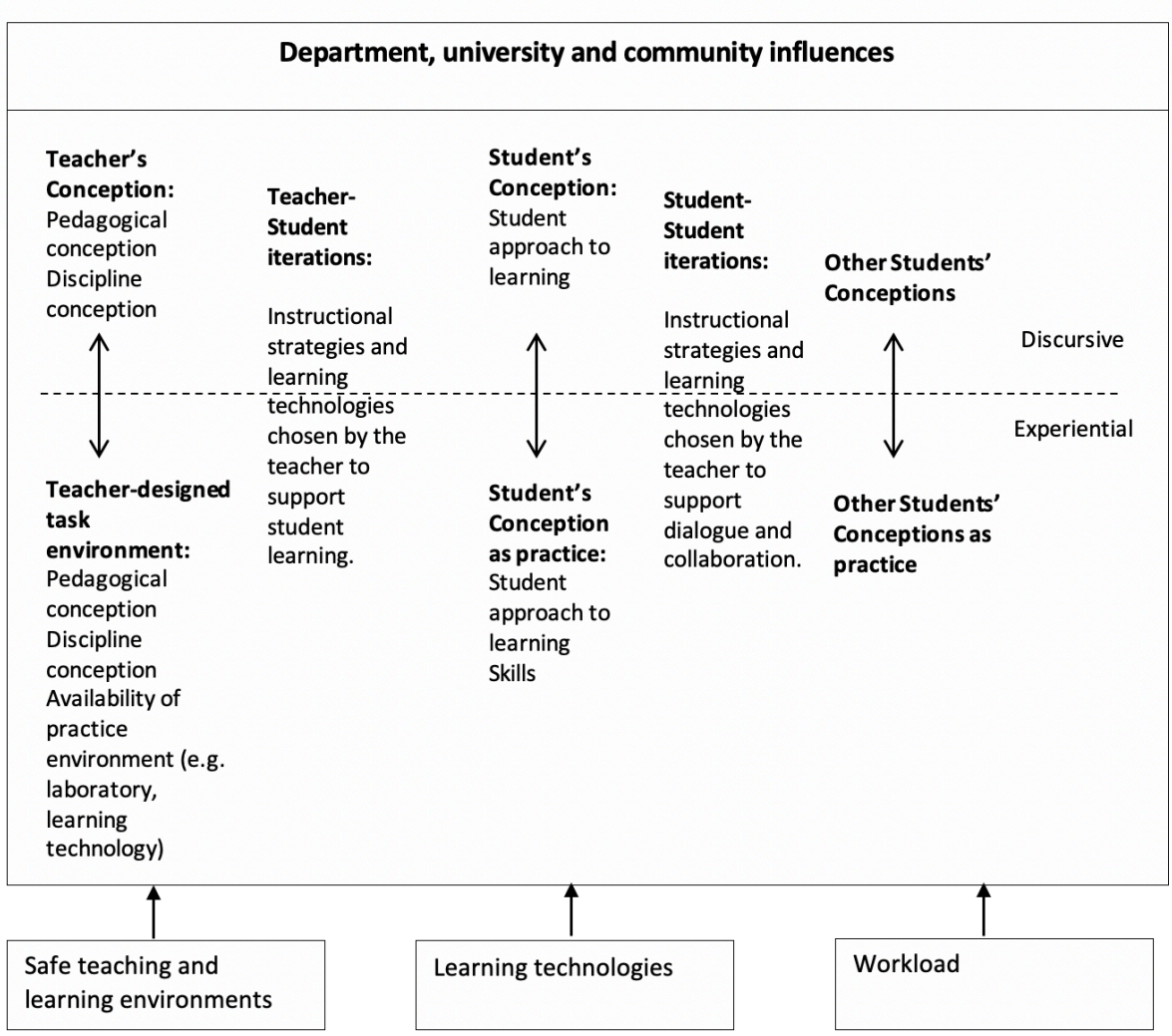
Learning-Centred Framework

Laurillard (2020) described her Conversational Framework as a series of iterations between the student and instructor. In my study, I asked instructors what instructional strategies and learning technologies they used in an attempt to understand those iterations. From my findings and my literature review, I would include the following items to create a more explicit understanding of the complexities of teaching and learning in post-secondary

environments: teacher pedagogical and disciplinary conception, student approaches to learning, safe teaching and learning environments, learning technologies, workload, and department, university, and community influences. This framework is illustrated in Figure 5 and explained in detail below.

Figure 5

Learning-Centred Framework



Teacher's conception. As discussed previously, Laurillard (2009, 2013) drew from learning theories to describe what it takes to learn in formal post-secondary settings.

Teacher's conception involves the presentation of concepts and answering questions or providing hints or cues to students. Teacher's conception also involves the pedagogical and disciplinary conceptions teachers have. I have used the term pedagogical conception to prevent confusion between teacher's conception and teaching conception. I believe it is helpful to more fully understand Laurillard's Conversational Framework by separating *conception* from *iteration.* I did not ask instructors in my study about their pedagogical conceptions and this could be an area for further study. However, instructors described the ways learning within a particular discipline might be unique. Helen, Hanson, and Bill started class with an item, such as a research article, news item, or video, to provide context to course concepts and to help students critically think about concepts and ideas. Helen provided learning activities to help students think like professionals in the field. Bjorn created a group assignment similar to tasks graduates of the program might be expected to complete on the job. Simulations and worksite placements allowed students to act in real-world environments of a particular discipline.

Student's conception. Students' conceptions include students asking questions and presenting their understanding of concepts provided by the teacher. Socio-cultural learning occurs when students articulate their ideas to other students and in turn listen to, evaluate, and respond to other students' ideas. Similar to teacher's conception, I believe a learning-centred framework should include student approaches to learning to help educators think about the cognitive work students undertake in response to iterations between the student and teacher, and among other students. My study did not explore student's approach to learning; however, instructors described strategies they believed would support student learning.

Instructors in my study acknowledged the need to prepare students to learn. Students may not know what is required or have the skills for learning in a post-secondary environment without explicit instruction. Instructors provided study tips and explicit directions to students. Helen suggested her students mind map or draw pictures to pull concepts together and provided examples of these items to students. She gave this information to students before class started. Bill sent notifications to students through the LMS reminding them to complete readings in preparation for the next class. He also included questions students should be able to answer to guide their reading.

Although learning objectives can communicate expectations to students, instructors said students did not always understand what learning objectives meant or how to use them to self-assess their own learning. Ben introduced new topics by asking students to complete real-world problems using existing knowledge before he presented new models or formulas. Ben believed students would better understand learning objectives and the purpose of the new model once they had built some intuition around the concept. Bill explicitly tied learning objectives, content, and learning activities together for students. He stated learning objectives at the beginning of a lesson, indicating what students should be able to do to meet the objectives. During class Bill repeated the learning objectives and at the end of class he provided a problem or activity for students to try. He expected students to self-assess whether they had achieved the learning objective or whether they needed additional practice or support. Hanson explicitly explained to students how learning objectives were worded so students could use the learning objectives to guide their own learning and study habits.

Ben, Bill, and Hanson used muddiest point activities in which students indicated concepts that were unclear. Ben incorporated a student response system into some classes to

better understand where students were having difficulty. Ben, Bill, and Brent circulated among students to identify whether students had questions or misunderstandings. Bjorn asked students to complete problems at home and return to class with questions or to indicate when they ran into problems. All instructors used the information gained to clarify explanations of concepts to students or to modify learning tasks.

Instructors in my study noted it was only after students received explicit instruction regarding expectations for learning that they could assume responsibility for their learning. By creating skeleton notes with learning outcomes, and explaining how they were designed, Hanson could help students assume responsibility for their learning. Bill worked with students to put definitions of terms into an online quiz application that students could in turn use for studying purposes.

Although instructors in my study provided feedback on students' practice tasks, they did not always know whether students used the feedback. Bill and Harmony shared their frustration when hearing students did not read the comments they had provided on students' papers. Laurillard (2013) described intrinsic feedback as being provided to students while a task is being completed rather than waiting for an instructor's judgement on how well a task has been completed. When students receive extrinsic feedback from instructors, students may require explicit explanation of the purpose of feedback and how they can understand and make use of the feedback for current and future learning situations. Instructors could plan extrinsic feedback at times and in ways that allow students to incorporate feedback into final practices tasks. Brent and Haley stated there is a need to include debriefing activities to ensure there is student reflection and learning after simulation events.

Safe teaching and learning environments. Instructors in my study noted some students feel intimidated when approaching new learning environments such as simulations. Instructors not only acknowledged that students felt intimidated but also created comfortable environments so students could focus on learning. Brent created in-class learning activities so students could become familiar with course concepts and collaboration with classmates. Brent used the in-class learning activities as a way to ensure students had the foundational knowledge of course concepts before starting the simulation. Students received tutorials on using the simulation software and had two trial periods to see how the simulation responded to students' input. Students were given class time to work in groups on the simulation. Brent circulated through the break-out rooms to answer questions. He described his role as that of a coach where he would not provide answers on what students should do, but would point out items in the simulation and help students analyze what was happening and then discuss possible reasons and responses.

Haley described the standardized process of high-fidelity simulation as a way to mitigate student anxiety. Students received an orientation on the day of the simulation event to review the scenario, student roles, confidentiality, the simulation setting, and safety nets. Safety nets allowed students to stop the simulation to regroup or refocus if they had questions or became overwhelmed. Debriefing guided students to reflect on their experiences and learn from any mistakes or questions. Haley worked with her colleagues to develop simulation events as formative and reflective experiences for students so students could focus on the learning rather than grades.

Hanson, Harmony, and Brandon also mentioned their own feelings of vulnerability when moving from a traditional role of lecturer. A learning-centred framework should

provide support, professional development, and policies for instructors to try new instructional strategies and learning technologies without fear of failure or evaluation.

Creating learning-centred environments can be complex as instructors consider learning theory, instructional strategies, and the explicit requirements as outlined in this framework. Instructors make decisions based on values and beliefs about what is important in teaching and learning (Pratt et al., 2019). Having supportive colleagues facilitates open discussions about expectations of students and supporting students to achieve those expectations. Academic department philosophy about teaching and learning can also have an impact on whether instructors focus on their teaching role or on other activities within their department and university (Garrison & Vaughan, 2013). Instructors in my study emphasized their relationship with colleagues or their academic department when making decisions about teaching and learning. Brent, Brandon, Halina, Haley, Hanson, and Helen described how their course, course concepts, and practice tasks fit within a larger program of study for students. Brent, Brandon, and Halina stated course resources were chosen by groups of instructors and were shared among instructors. Haley worked with instructors within her department to create simulation settings that aligned with different course learning objectives. Brandon described his role as an instructor in helping first-year students understand issues of academic integrity so his colleagues did not have to do so in subsequent courses. Ben, Brent, Bjorn, Halina, Hanson, and Hope mentioned the mentoring they received from colleagues, especially when they began their university teaching careers.

Learning Technologies. Instructors made deliberate decisions about the use of learning technologies in their courses. Bjorn, Harmony, and Hanson reflected on their use of digital presentation tools to distill and clarify key course concepts to students. Ben, Bill,

Brad, Harmony, Hope, and Helen used learning technologies to present concepts to students in different ways, including graphics or video to provide additional context to students' learning or the examples discussed. Brandon adopted publisher resources, allowing students to take a mastery learning approach to software applications. Brandon also used the tracking feature in the LMS to see how often students watched video explanations he created. Communication technologies allowed students to ask questions, articulate their own understandings, hear ideas of classmates, and collaborate with others. Simulations provided students with real-world examples as they worked in groups.

Garrison & Vaughan (2008) described the need for thoughtful integration of learning technologies that tie together in-class and online learning opportunities for students. Although learning technologies have become ubiquitous in post-secondary learning, instructors must consciously evaluate the purpose of learning technologies and what their use is expected to accomplish (Ali, 2020; Altinpulluk & Kesim, 2021). Laurillard's (2013) Conversational Framework provides a way to analyze the ways different media or learning technologies support the requirements for learning. However, learning technologies has been listed as a separate item to emphasize the need for thoughtful evaluation and integration to create learning-centred environments. This may minimize presumptions that a *rich* media, such as video, provides more interactivity than it actually does.

***Learning how to learn using technology*.** Although technology has become ubiquitous in academic and non-academic life, students may need explicit guidance about how to learn using technology. Bill wondered whether students knew what was expected when learning with technology, specifically when participating in an online discussion. He asked students to complete an online discussion activity in class so he could model the

expectations for a posting and could further provide feedback to help students understand the requirements. Hope explicitly told students they would be graded on the process of posting and replying to classmates in the online discussions. Hanson provided information on the equipment students would need to attend a synchronous conference. He conducted the first class in a physical classroom to explain to students how they would log in, listen and watch the presentation, and participate in discussions.

Learning through simulations, especially high-fidelity simulations, has a well-defined process (Brindley et al., 2007). Haley acknowledged the difference between preparing for a simulation event one to two weeks before the event and helping students on the day of the event. Prior to a simulation event, students reviewed the scenario, read articles, watching video, completed a quiz, or attended a skills practice lab. On the day of a simulation event, students received an orientation to the concepts, learning outcomes, and the scenario. Brent also recognized the need for different types of preparation before students engaged with the simulation. Preparation included a review of concepts that students would be required to draw upon as well as group learning activities to help students get to know classmates they would be working with. Students were also given an orientation to the actual simulation program itself.

Workload. Although workload of both students and instructors is discussed in the literature (e.g., Broeckelman-Post & MacArthur, 2018; Hora, 2016; McCormick, 2011), exploring workload was not a focus of my study. However, instructors in my study mentioned the workload for both instructors and students when making decisions about teaching and learning strategies. The concept of workload included items such as challenging course concepts that are difficult for students to comprehend and apply, the amount of

content instructors must cover or students must learn, the amount of marking for instructors, the number of assignments students must complete, or other courses students may be taking. Bjorn created a group assignment he referred to as a course capstone. By combining smaller assignments into one larger assignment and allowing students to collaborate on the assignment, he believed it was a better learning task for students because a shared workload enabled students to focus on the course concepts. Marking one larger group assignment significantly decreased the workload for the instructor and freed up time to provide formative feedback as groups worked together. Brad created narrated videos as a way to present concepts to student. Although there was significant work involved for the initial creation, Brad saw the benefit to his workload because, once the videos were created, future offerings of the course required less preparation. Ben used narrated videos as a way to explain course assignments to students. This provided additional class time for presentations, discussions, and practice tasks.

Department, university, or community influences. Safe teaching and learning environments, learning technologies, and academic departments have been discussed as individual items within the framework to explicitly highlight the need for instructors to consider. However, these items also surround the framework because they include issues outside of individual courses or programs of study. Because they permeate a whole university, they may affect learning-centred environments, especially if there is incongruence. Although exploration of these items is beyond the scope of my study, I do not believe a framework of learning-centred education can ignore the influence of these items, and have therefore included possible examples.

Students must feel safe within their university in ways that extend beyond the classroom. Examples of items that fall within the greater concept of safety could include location of the university campus within a city, campus security, availability of counseling, services to students with disabilities, gender inclusive environments, or supports for marginalized students.

Technology has become ubiquitous in the university environment and often we are not aware of the impact technology has come to have on our roles, operations, processes, and learning. Classrooms may have projectors, audio systems, smart boards, or wireless Internet. Email may be the standard form of communication for academic information, institutional announcements, or emergency notifications. Libraries may have common computer areas and access to digital resources and databases. The LMS may be used for non-academic course offerings such as study skills or transition to university programs. Writing services or advising departments may make use of technology to provide services to students. Student application, registration, financial, and grading systems may be accessed using a university computing account.

Policies, procedures, and initiatives within an academic department, a university, or a community may impact learning-centred education. Examples of items under this topic could include supports and professional development opportunities for instructors, the number of full-time versus contract or adjunct instructors, policies around hiring and advancement of instructor positions, and decisions around learning technologies.

It is often the Chief Information Officer (CIO) or Chief Technology Officer (CTO) who is responsible for the acquisition, deployment, and support of learning technologies within post-secondary institutions. The Chief Academic Officer (CAO) or Provost is

responsible for institutions' academic affairs (Jones, 2013). Shared governance is the term used to describe the involvement of academics, or faculty, in decision-making within post-secondary institutions (Stensaker, 2013). Most Canadian universities have adopted a bicameral governance structure, which means the board makes decisions related to administration and finance while the senate, or similar academic body, makes decisions related to academic policies (Jones, 2013). According to Sarid (2009), technology application must be critically evaluated and debated in a public sphere. Individuals should be empowered to engage in debate so technology serves those who use it. Policies related to the governance of learning technologies should ensure inclusion of faculty members.

Conclusions. Using Laurillard's Conversational Framework allowed me to explore how instructors used instructional strategies and learning technologies to support student learning in a way that considered requirements for learning in a formal post-secondary environment. Instructors used a variety of instructional strategies and learning technologies to address presentation of concepts, the ability for instructors and students to check students' understandings, and engagement in practice tasks. Decisions were deliberate and often came after instructors had gained experience teaching.

In an attempt to clarify learning-centred education, a framework was created to capture themes emerging from my study. A learning-centred framework must include "what it takes to learn" (Laurillard, 2009, p. 7). Explicitly separating teacher and student conceptions from iterations helps identify the complexities of formal learning. Other components were found to influence instructors' decisions around teaching and the use of learning technologies. These included safe teaching and learning environments, learning technologies, and workload for instructors and students. Although beyond the scope of my

study, broader department, university, or community influences should also be included because of their potential influence on learning-centred education. Student learning is not confined to a particular class.

Instructors in my study shared the ways they explicitly guided students. Similarly, a learning-centred framework explicitly includes components for a learning-centred environment. The framework recognizes the complexities of teaching and learning and acknowledges discipline-specific requirements, including collaboration among instructors. As new and rich learning technologies become available, a learning-centred framework allows examination of how the learning-technologies may affect learning (e.g., the sequential nature of an LMS), the true impact to learning (e.g., video that simply presents content), and the need to prepare students to use learning technologies (e.g., practicing online discussions in class).

Recommendations

The conclusions drawn from the research questions indicate teaching and learning in a formal post-secondary environment is complex. Instructors choose instructional strategies and learning technologies by considering what it takes for students to learn within a particular discipline or course, students' experiences and knowledge about learning and thus their ability to be independent learners, the benefit of learning technologies to meet teaching and learning goals, students' knowledge about using learning technologies for learning, instructor and student workload, safe teaching and learning environments, academic department expectations, and relationships with colleagues. From the conclusions drawn, recommendations for university administrators, instructors, professional development leaders, and researchers follow.

Recommendations for University Administrators

University leaders such as deans, department chairs, or those who develop policies are encouraged to consider the following:

1. Instructors in my study mentioned they felt vulnerable when they changed their focus from an expert lecturer. Feelings of vulnerability may prevent instructors from trying new instructional strategies and learning technologies, especially if there is a risk that students could provide poor feedback. Opportunities for instructors to be innovative without risk requires support by department chairs, deans, and other leaders. Without this support, instructors may avoid criticism by relying on existing instructional strategies and learning technologies.
2. Instructors in my study mentioned it was only through experience they developed the ability to make certain decisions about instructional strategies and learning technologies (e.g., Brandan could assess student workload only from experience). Policies around professional development, scholarly activity, or funding may support instructors to develop their pedagogical conceptions as they gain experience.

Recommendations for University Instructors

As university instructors reflect on their teaching, they are encouraged to consider the following:

1. Instructors in my study questioned whether students had the fundamental learning skills or experience to take responsibility for their own learning. Ensure students know what they are expected to do and why they are being asked to complete certain learning tasks by explicitly explaining the connection between learning outcomes, learning tasks, and assessments. For example, Bill presented learning outcomes

before presenting content and then asked students to complete a learning activity to self-assess whether they met the learning outcome. Describe how scholars within a particular discipline may approach learning and what graduates may be expected to do in a work setting. For example, Helen provided suggestions for learning course content and Bjorn created a group assignment that mimicked real-world data and reports graduates would encounter).

2. Instructors in my study reflected on the instructional strategies and learning technologies they used and whether they accomplished teaching and learning goals. It is recommended instructors engage in reflective practice to guide teaching and learning decisions as well as to develop pedagogical conceptions.
3. Instructors in my study worked with colleagues to make decisions about teaching and learning. Colleagues may be willing to share innovations they have tried as well as problems they may have experienced (e.g., Ben, Brent, Bjorn, Halina, Hanson, and Hope relied on colleague mentors when they began teaching). Instructors felt vulnerable, especially when they were trying new strategies. Supportive colleagues may be helpful in working through feelings of vulnerability.

Recommendations for staff supporting instructor professional development.

Instructors may engage in various forms of professional development, including mentorship, credit courses, self-study, workshops, and conferences. These recommendations are applicable to all forms of professional development activities.

1. Instructors in my study mentioned educational university degrees, colleagues, and experience as the main influences on the development of their knowledge about teaching and learning. They also emphasized the type of teaching and learning

activities required for learning in their courses. Recognition of instructors' pedagogical conceptions (e.g., Pratt's (1992) Teaching Perspectives Inventory) may help support staff provide professional development that aligns with instructors' conceptions and disciplinary knowledge.

2. Instructors in my study described feeling vulnerable. Feelings of vulnerability may prevent some instructors from trying innovative instructional strategies or learning technologies. Addressing instructor vulnerability and student intimidation during professional development may help instructors provide support for students to be successful and reduce instructors' feelings of vulnerability (e.g., Brent and Haley prepared students for potentially intimidating simulation experiences).

Recommendations for researchers.

Research contributes to what we know about teaching and learning. Continued research informs practice and explores changing learning technologies.

1. The literature (Hepplestone & Chikwa, 2014; Laurillard, 2013; McAlpine, 2014) and instructors in my study noted the importance of feedback to students. However, learning technologies did not seem to provide ways for instructors to determine whether students were accessing feedback or how students might be interpreting and using feedback. Research is needed to develop learning technologies that provide this information to instructors and students.
2. My study occurred before COVID-19. The move to online and remote learning in response to the pandemic required instructors to use learning technologies (Decillia, 2021; Kamble et al., 2021; Wasik, 2020). Research is required post-COVID-19 to explore changes in the use of instructional strategies and learning technologies.

Topics of research could include blended or online learning or specific learning technologies.

Personal Reflections

I enjoyed conducting this study and having the opportunity to listen to the opinions and experiences of the instructors I interviewed. I appreciated the time they took to answer my questions and discuss their teaching. The results of my study may be influenced by the criteria I chose for selecting the faculties from which I invited instructors to participate. In particular, the collegial nature of working with and learning from colleagues. The faculties were chosen based upon answering "yes" to the following questions:

- Is there an overall direction to use learning technologies to support teaching and learning within the faculty?
- Are instructors identified to lead and support other instructors in the use of learning technologies?
- Does the faculty provide supports to faculty leaders through things such as release time, opportunities to show-case teaching initiatives, or professional development?

When I approached my study, I wanted to obtain a broader picture of how instructors integrate instructional strategies and learning technologies. Upon reflection, taking such a broad approach does limit the depth of exploration into any particular instructional strategies and learning technologies. As I progressed through the data analysis, other questions arose that could be possible areas of further study.

1. My study focused on instructors who taught in faculties that provided direction and support in the use of learning technologies to support teaching and learning. It would

be interesting to hear whether instructors who taught in faculties that did not provide the same level of direction and support had similar experiences and opinions.

2. Instructors in my study shared their ideas about instructional strategies and the use of learning technologies and how those supported student learning before COVID-19. Because instructors have had to use learning technologies during COVID-19, more current research is needed.
3. I asked instructors what they did to support student learning. I did not ask about their conceptions. Further research could provide a detailed exploration of both instructors and students' conceptions. How do pedagogical and disciplinary conceptions affect instructors' integration of instructional strategies and learning technologies? What approaches to learning do students use? Do students find the instructional strategies and learning technologies useful? Do the instructors' intentions match student experiences? For example, Ben provided hand-out assignments to facilitate discussion and build student intuition. He thought this was a better introduction to course topics than learning outcomes. Would his students agree? Bill asked students to practice making online discussion postings in the classroom. He thought students needed practice to use the learning technology and feedback on what made a good online posting. Did his students find this practice helpful? Research exploring Pratt's (1992; Pratt et al., 2001) Teaching Perspectives Inventory and Laurillard's (2013) Conversational Framework might provide additional insight on teacher's conceptions.
4. Instructors in my study relied on colleagues, mentors, self-study, and professional development to learn about teaching and learning as well as learning technologies. It would be interesting to see the process instructors went through, from initially

learning about a learning technology to implementation with students. What were the key triggers that led instructors to try a new learning technology? How might these findings inform professional development and support for instructors?

During my study, I noted the frequency instructors indicated they helped students to learn how to learn within their discipline and within a post-secondary environment. This requires instructors to have knowledge and skills related to teaching and learning, as well as the use of learning technologies. I began to question the place of education scholars within a teaching university, especially those who are not faculty members within a Faculty of Education. What is the place of non-faculty education scholars related to governance or access to research funding? Hanson and Helen had graduate degrees in education and drew upon that knowledge to make instructional decisions. Ben, Brent, Bill, Halina, Haley, Harmony, and Hanson stated one of the ways they learned about teaching and learning was through professional development activities.

Instructor vulnerability caused me to question the underlying reasons some instructors may be unwilling to admit their lack of knowledge or skills related to teaching and learning, and the use of learning technologies. Instructors in my study were experienced and tenured, yet they admitted they felt vulnerable when they moved from being an expert presenter of content and integrated learning-centred strategies. What vulnerabilities might instructors feel when they receive student feedback when an instructional strategy or learning technology did not work as planned? What vulnerabilities might instructors feel when they admit their lack of knowledge and skills to colleagues, department chairs, or learning technology support staff? How do institutional policies related to faculty evaluations (e.g., peer reviews or

student feedback) impact instructor vulnerability? How do these policies affect instructor decisions around teaching and learning innovations or the use of learning technologies?

I began to wonder how learning technologies drive instructional decisions. For example, how do digital presentation tools guide our thinking about how course concepts can be presented to students (Adams, 2006)? Harmony and Bjorn worked to minimize their digital presentations to distill slides to include key concepts. Explanations or examples of those key concepts were not included in the slides. Hanson and his department decided to use a synchronous conferencing tool so students did not have to go to the university on a day they only had one class scheduled. Hanson first decided to use the synchronous learning technology and then made decisions about how he would modify instructional strategies for the learning technology. I realized the iterative process that instructors go through, going back and forth between pedagogy and learning technology. I further see how this iterative process has influenced the development and use of learning technologies. For example, some learning management systems have syllabi tools that integrate with calendars, grade books, and reminders for students. Do these tools mimic or influence the ways instructors interact with their students? Perhaps they do both. Although instructors in my study indicated they collaborated with colleagues on the use of learning technologies, they did not mention policy or governance related to learning technologies at their university. If learning technologies have the ability to influence teaching and learning, what policy or governance systems should be in place? How are decisions made about the learning technologies that are available and supported within a university? What expectations exist related to how learning technologies are used by instructors and students?

As I take learnings from my study to my role in post-secondary education, I think about how institutions can move forward to support instructors' pedagogical conceptions. Learning technologies continue to develop and become available for instructors, students, and others. The intersection between academia and learning technologies, which are sometimes placed under information technology leadership, becomes increasingly important. Professional development, training, and support in the use of learning technologies may no longer be sufficient. Larger questions around the goals of institutions, requirements of instructors, and expectations of students may be best addressed at institutional or faculty levels. Institutions may spend considerable time and money to plan physical learning spaces. Perhaps we should give equal consideration when planning digital learning spaces for instructors and students.

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Appendix A - Letter of Initial Contact

Study Title: Exploring Faculty Members' Use of Learning Technologies to Support Student Learning

Research Investigator:
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Supervisor:
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780-492-5868

Date

Dear _____:

My name is Lynn Feist and I am the Director of the eLearning Office at MacEwan University. Being a graduate student at the University of Alberta, I am conducting a research study to explore faculty members' use of learning technologies to support student learning. The study will focus on how technologies are used and the considerations made by faculty members as they choose instructional strategies in their classes.

The results of this study will inform education theory and advance knowledge in the area of learning technologies. Results will also inform teaching and learning practices in post-secondary institutions, including ways to design professional development opportunities for faculty. This study may also influence institutional policies related to faculty reward, the support and use of learning technologies, and orientation for new faculty.

I received your name from _____, who thought you may be interested in participating in the study. You will be asked to allow me to interview you on one occasion, at a time and location that is convenient to both of us. The interview will last 60 – 90 minutes and will be audio-recorded. It is anticipated that interviews will occur between June and November, 2016. After the interview, I will provide you with a descriptive summary of the interview to ensure that I have adequately captured your experiences. The descriptive summary will be sent to your institutional email and will be password protected to maintain confidentiality.

To protect your confidentiality, your name or identifying information will not be included in any transcriptions, summaries, notes that I make during the interview, or in final documents.
Your participation is completely voluntary. You can opt out without penalty at any time and can ask to have any collected data withdrawn and not included in the study.

Please contact me at 780-497-5407 or FeistL@macewan.ca if you are interested in receiving more information. I will be contacting you in the near future to ensure this letter was received and to answer any questions. Thank-you for your time and consideration of this request.

Sincerely,

Lynn Feist

Appendix B - Information Letter and Consent Form

Study Title: Exploring Faculty Members' Use of Learning Technologies to Support Student Learning

Research Investigator:
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Director, eLearning, MacEwan University
EdD Student, University of Alberta
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Background

- You are being asked to participate in this study because you use learning technologies, such as Blackboard Learn or Moodle, to support student learning.
- I obtained your name in one or more of three ways, namely from:
    - the list of Distinguished Teaching Award Winners on the Centre for the Advancement of Faculty Excellence (CAFÉ) website **OR**
    - your department chair **OR**
    - Through recommendations from other people or research participants.
- The results of this study will be used in support of my dissertation, which is part of my doctoral degree requirements at the University of Alberta.

Purpose of the Research

- The purpose of this research study is to explore the ways that faculty members use learning technologies, such as Blackboard Learn or Moodle, to support student learning. The study will focus on how technologies are used and the considerations made by faculty members as they choose instructional strategies in their classes.

  The results of this study will inform education theory and advance knowledge in the area of learning technologies. Results will also inform teaching and learning practices in post-secondary institutions, including ways to design professional development opportunities for faculty. This study may also influence institutional policies related to faculty reward, the support and use of learning technologies, and orientation for new faculty.

Study Procedures

- As a participant in this study, you are asked to allow me to interview you on one occasion, at a time and location that is convenient to both of us. The interview will last 60 – 90 minutes and will be audio-recorded. It is anticipated that interviews will occur between May and October, 2016.
- After the interview, I will provide you with a descriptive summary and a transcript of the interview to ensure that I have adequately captured your experiences. The descriptive summary will be sent to your institutional email and will be password protected to maintain confidentiality.
- To protect your confidentiality, your name or identifying information will not be included in any transcriptions, summaries, notes that I make during the interview, or final documents.

Potential Benefits

- You will not benefit financially from being in this study, you may benefit professionally by articulating your understandings of your teaching practices.
- I hope that results of this study will inform educational theory, teaching and learning practices at universities, and institutional policy.

Potential Risks

- You may think about your teaching in a different way during the interview. If you wish to discuss teaching and learning after the interview, you will be able to access resources, which are available to all faculty, through CAFÉ or Blackboard Support.
- You may experience fatigue during the interview. You can request a break at any point during the interview.
- The interview will take 60-90 minutes of your time.

Confidentiality & Anonymity

- The results of this research will be used in my dissertation, research articles, and presentations. You will not be personally identified in any of these.
- In order to protect your confidentiality, recording and computer devices will be password protected. All electronic research data will be stored in an encrypted folder on my computer. Hard copy materials will be stored in a locked filing cabinet.
- Your name, department, courses taught, or other identifying information will not be included in transcripts, research documents, or other dissemination of the research results. Results will be reported according to themes found during the study. When I include direct quotations from the interview, you will be given a pseudonym.
- The consent forms will be stored separately from the research data and analysis.
- My University of Alberta research supervisor and I will have access to the data. My supervisor will only see data that have had any identifying information removed. If another person transcribes the recordings of the interview, that individual will be required to sign a confidentiality agreement.
- All data will be kept in a secure place for a minimum of 5 years following completion of research project to comply with University of Alberta policy and requirements. Hard copies will be stored in a locked filing cabinet and electronic data will be stored on an encrypted computer folder. After 5 years following completion of the research, all hard copy materials will be securely shredded. Electronic data will be deleted and any external storage devices will be re-formatted.

Voluntary Participation and Right to withdraw

- You are under no obligation to participate in this study. Your participation is completely voluntary and you can answer only those questions that you are comfortable with.
- You can opt out or withdraw without penalty at any time up to one month after I return the interview summary and transcript. Up to this point you can ask to have any collected data withdrawn and not included in the study. In the event of opting out, your examples, quotes, and experiences will not be included in any documents. To withdraw, you may simply contact me by telephone or email as listed above. Alternately, if you feel uncomfortable contacting me directly, you can contact my research supervisor, Dr. Jose da Costa, at the University of Alberta (jdacosta@ualberta.ca or 780-492-5868) to indicate your desire to withdraw.

- After one month has passed since I shared the interview summary and transcript with you, I will commence data coding and analysis, after this point it will no longer be possible for me to remove your comments or ideas from my writing.

Follow up and Further Information

- If you would like to receive results from the study you can let me know immediately following the interview or by contacting me by telephone or email as listed below.
- If you have any further questions regarding this study, please do not hesitate to contact me at FeistL@macewan.ca or 780-40-5407 or my supervisor, Dr. José da Costa at jdacosta@ualberta.ca or 780-492-5868.

Questions or Concerns about Ethical Conduct

- The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and the MacEwan University Research Ethics Board. For questions regarding participant rights and ethical conduct of research, contact the University of Alberta Research Ethics Office at (780) 492-2615 or the MacEwan University Ethics board at (780) 633-3274 or REB@macewan.ca.

Documenting Consent:

- Consent does not constitute a waiver of legal rights in the event of research-related harm.

Signed Consent

My signature below indicates that I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and I will receive a copy of this consent form after I sign it.

Name of Participant	Signature	Date

Researcher's Signature	Date

A copy of this consent will be left with you, and the researcher will take a copy.

Appendix C - Interview Guide

An interview guide will help to ensure that comparable data is collected during the semi-structured interviews. It is expected that a conversation with participants will develop around the questions. The study's sub-questions have been included to guide and focus the interview. Faculty members will be invited to consider one course they teach in which they use learning technologies to support student learning. The questions are based upon Laurillard's (2009) summary or checklist using the Conversational Framework. I anticipate that these questions will be revised as I conduct my first few interviews and learn from those initial experiences. Furthermore, other probes I have not yet considered may emerge as they relate to the main questions posed below.

Introduction

Before the interview begins, participants will be told that they can withdraw at any point during the interview and up to one month after I provide participants with copies of transcripts and descriptive summaries. Participants can contact me or my supervisor to withdraw from the study and not have any of their data included in the study using the contact information on the consent form.

Participants will also be informed that they can take a break during the interview if they begin to experience any fatigue.

Background

1. How long have you been teaching at a university?
2. Tell me about the course that we will be discussing in this interview.

3. Tell me about the ways in which students receive explanations or presentation of topics or ideas in the course.
    a. How are difficult concepts presented?
    b. How might students learn about the relation among concepts?

4. How do you check students' understandings of the topic, theory, or ideas?
    a. What opportunities do students have to ask questions and receive clarification on their understanding of a topic, theory, or idea?

5. How is technology used to support presentation, explanation and understandings of a topic?

6. How do students practice what they have learned and then receive feedback on their performance?
    a. What kinds of learning activities do students complete?
    b. What kinds of feedback do they receive after completing learning activities?
    c. How are students motivated to adapt actions or understandings based on feedback?

7. How is technology used to support student practice or to provide feedback?

What opportunities are created for students to discuss or debate ideas with classmates or to reflect on and share their experiences and learning?

8. How might students share and discuss ideas or actions with their classmates?

9. How might students collaborate with classmates to complete learning activities or assignments?
10. Are there opportunities for students to articulate understandings to classmates through essays or presentations?

11. How do students articulate understandings to you, the teacher, through things such as reports, essays, or presentations?

12. What kinds of opportunities do students have to reflect on their experiences?

13. How are opportunities for [constructivist and collaborative][1] activities designed and then explained to students?

14. How is technology used to support opportunities for [constructivist and collaborative] activities?

[1] Questions will relate to specific activities that have been described by the faculty member.