

2018-01-10

Online Instructors' Teaching Practices with the Use of Universal Design for Learning in Higher Education

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Altowairiki, N. (2018). Online Instructors' Teaching Practices with the Use of Universal Design for Learning in Higher Education (Doctoral thesis, University of Calgary, Calgary, Canada).

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Online Instructors' Teaching Practices with the Use of
Universal Design for Learning in Higher Education

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN EDUCATIONAL RESEARCH

CALGARY, ALBERTA

January, 2018

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Abstract

The implementation of Universal Design for Learning (UDL) in designing and facilitating online learning addresses diverse learning needs and preferences. UDL provides multiple ways for students to engage in learning, various methods to display content, and diverse options to demonstrate knowledge. Integrating UDL into online teaching and learning approaches requires considerable preparation and support.

A case study was used to explore online instructor practices for the development of teaching capacity in the design and facilitation of a graduate program based on UDL principles. The following research question guided the investigation: How do instructors develop their capacity to design and facilitate online learning using UDL principles? Multiple stakeholders including instructors, academic leaders, instructional designers, and educational development providers participated in the study. The aim of the research was to provide a holistic picture of the UDL implementation process from preparation through final outcomes. Data were collected from semi-structured interviews and documents.

The findings from the study indicated that effective UDL integration requires strong leadership presence to set the stage through having clear vision and strategic plans, ensuring sufficient resources and educational development opportunities are in place, and creating a recognition and reward system. Further, the use of community of practice as an educational development method was a major factor in supporting the development of teaching capacity for the online instructors, thus fostering UDL integration. For example, the online instructors and the Academic Coordinator met regularly to collaboratively design the courses, provide peer feedback, exchange resources, and reflect on their teaching practice. Having such a learning community influenced the instructors' sense of belonging and satisfaction; accordingly, the

instructors were more engaged in the development process. The findings and implications of this study contribute to the body of knowledge regarding UDL integration in higher education context. Meaningful UDL implementation involves thoughtful considerations of what to do before, during, and after the integration.

Acknowledgements

First and foremost, I thank Allah for endowing me with health, patience, and a mind for learning to accomplish this PhD journey. Additionally, I have many people to thank for their support and encouragement throughout my journey.

I would like to thank my family for the love, encouragement, and prayers they provided me through my entire life. Without their support and belief in me, I would not have been able to continue this journey. Particular thanks go to my mother and father for their encouragement and support throughout my study and also to my lovely husband, Ahmad, and my daughter, Dana, who, with their unconditional love and incredible support, have helped me to accomplish this task. Special thanks to my sisters and brothers who have always cared about my success and have given me tremendous support.

I thank Dr. Jennifer Lock and my doctoral committee members for their guidance and insightfulness. I am truly grateful to be mentored and inspired by Dr. Lock during my Master's journey first, and then followed by this PhD. My thanks to her are beyond words. I am grateful also to my doctoral committee, Dr. Michele Jacobson and Dr. Sharon Friesen, for their constructive feedback and guidance that resulted in this work.

I owe a debt of gratitude to the participants in my study who were open and committed to sharing their experiences, thoughts, time, and expertise with me. Your contribution is highly appreciated and is something that cannot be repaid.

Finally, my grateful thanks to the Ministry of Higher Education in the Kingdom of Saudi Arabia for sponsoring me during my study.

The dissertation was edited by Dr. Virginia McGowan, McGowan & Co.: The Write Edit Group in accordance with Editors Canada's guidelines on ethical editing of dissertations and theses.

Table of Contents

CHAPTER ONE: INTRODUCTION.....	1
Introductory Statement.....	1
Problem Identification	2
The Research Purpose.....	4
Research Questions	4
Rationale for the Study	5
Significance of the Study	7
Theoretical Framework.....	7
Constructivism.....	8
The Researcher's Background	10
The Researcher's Assumption	12
Definition of Key Terms.....	13
Organization of the Dissertation	14
CHAPTER TWO: LITERATURE REVIEW.....	15
Teaching in Higher Education	15
Online Learning	21
Introduction.....	21
Communication.....	22
Community.	24
Instructor presence.....	27
Educational Development for Online Teaching	28
Introduction.....	28
Leadership for online teaching.	31
Methods.	32
Critical success factors for online learning.....	38
Universal Design in Education	39
Universal Design for Learning.....	43
Expert learning.....	46

UDL implementation.	48
UDL misconceptions.	49
UDL Implementation in Higher Education Courses.....	51
Review of Empirical Research Conducted on UDL in Higher Education.....	55
Positioning the Study	62
CHAPTER THREE: RESEARCH DESIGN	64
Introduction.....	64
Methodology	64
Rationale for selecting case study methodology.....	67
Case Description	68
Research Questions	69
Methods of Data Collection	69
Methods of Data Analysis.....	71
Integrity of the Study	74
Internal validity or credibility	74
External validity or transferability.....	76
Reliability or consistency.....	76
Boundaries of the Study.....	77
Delimitation of the study.	77
Limitations of the study.	78
Successes and Challenges of the Research Design.....	79
Ethical Considerations	80
Summary	80
CHAPTER FOUR: FINDINGS.....	82
Context of the Study	82
Study Participants	83
Analysis of the Data.....	86
Online Learning Success.....	86
Design and facilitation of online learning.....	87

Support for online teaching.....	91
Summary.....	97
Universal Design for Learning.....	97
UDL definition.....	97
Preparation.....	100
Implementation.....	103
Support.....	105
Challenge.....	106
Summary.....	108
Universal Design for Learning in Practice.....	108
The Community of Practice.....	109
Program design.....	111
Instructor satisfaction.....	120
UDL integration assessment.....	122
Scholarship of teaching and learning.....	123
Conclusion.....	124
Verification of the Case Report.....	125
CHAPTER FIVE: DISCUSSION.....	126
Introduction.....	126
The Role of an Academic Institution in Support of UDL Integration.....	127
Summary.....	133
Supporting UDL Implementation in Online Learning.....	134
Summary.....	142
Designing Online Learning Environment Based on UDL.....	143
Summary.....	150
Framework.....	151
Leadership.....	152
Community of practice.....	153
Knowledge and skills.....	153
Conclusion.....	154
CHAPTER SIX: RECOMMENDATIONS AND CONCLUSION.....	156
Summary of the Study.....	156
Implications for Practice.....	158
Implications for institution.....	158

Implications for faculty.....	159
Implications for instructors.....	160
Recommendation for Future Research.....	160
Conclusion	162
REFERENCES.....	164
Appendix A: Interview Questions for Instructors	184
Appendix B: Interview Questions for Academic Leaders.....	186
Appendix C: Interview Questions for Educational Development Providers	188

List of Tables

<i>Table 1. Emerged Themes and Sub-themes</i>	86
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List of Figures

Figure 1. A sample of created thematic map for data analysis	74
Figure 2. Fostering UDL infusion in online learning framework.....	152

CHAPTER ONE: INTRODUCTION

Introductory Statement

The popularity of online learning is increasing rapidly, based on the number of students seeking to earn their education in this fashion. According to Allen, Seaman, Poulin, and Straut (2016), 2.8 million students took all their courses online in the fall of 2014, which represents 14 percent of all higher education students in the United States.

Effective integration of technology in education opened doors for learners around the world to enroll in educational institutions without the need to be in a physical classroom for the purpose of learning and to gain certification. Some scholars consider online students as “non-traditional” learners (Rao, 2012; Rudestam & Schoenholtz-Read, 2010) due to their distance from institutions, their abilities, their decision to return to pursue their studies after an extended period away from doing so, and/or their desire to take courses while having full-time jobs (Rao, 2012). The question to be asked is: How should we design inclusive online courses/programs to meet the needs of diverse/non-traditional learners?

UDL (Rose & Meyer, 2002) provides a blueprint for educators to create an environment and design curricula that meet diverse learners’ needs by offering flexibility without reducing the quality of standards (Hickey, 2013). By integrating UDL into online teaching and learning approaches, instructors would be in a better position to design learning environments that consider “the backgrounds, characteristics, and needs of diverse students who may enroll in their course” (Rao, 2012, p. 1).

UDL developers rejected the idea of “one-size fits all” in a learning environment, and encouraged educators to use multiples means of engagement, representation, and expression

(Rose & Meyer, 2002). Gardel and Edson (2009) confirmed that higher education students are diverse in their learning preferences and stated that instructors who are committed to their students' success believe that a singular teaching approach does not work well with all students.

UDL stems from a broad base of research in neuroscience that focuses on how the brain learns “as reflected in the affective, recognition, and strategic learning networks” and education that focuses on the components of effective teaching “as reflected in optimal techniques for building engagement, knowledge, and skills” (Meyer, Rose & Gordon, 2014, p.88). This combination of neuroscience and educational research resulted in three principles (Rose & Meyer, 2002, p. 75):

- Principle 1: To support recognition learning by providing multiple, flexible methods of presentation.
- Principle 2: To support strategic learning by providing multiple, flexible methods of expression and apprenticeship.
- Principle 3: To support affective learning by providing multiple, flexible options for engagement.

UDL has been implemented successfully in higher education contexts whether the courses are offered face-to-face, online, or through blended approaches (e.g., Morra & Reynold, 2012; Rose, Harbour, Johnston, Daley & Abarbanell, 2006).

Problem Identification

Online teaching requires sufficient preparation and support to successfully meet desired expectations and outcomes. Providing preparation and training programs for online instructors

has increased to meet the high demand of higher education online learners around the world. In 2009, 19 percent of more than 2,500 academic institutions in the US reported that they did not provide any training programs for their faculty to teach online; in contrast, in 2011, less than 6 percent of the institutions reported they did not provide online training programs (Allen & Seaman, 2011). These training programs, however, may not meet the needs of online instructors, as some of them focus only on the technological aspect of online teaching rather than on pedagogical aspects (Taylor & McQuiggan, 2008). Moreover, providing training programs without ongoing support may not effectively assist online instructors. Little is known about how academic institutions could prepare and support their instructors to teach online courses successfully (Herman, 2012; Lackey, 2011; Taylor & McQuiggan, 2008).

As the number of online learners increases rapidly, an accessible learning environment is required to meet their needs. Accordingly, several scholars highlighted the importance of considering online learners' diversity in background, culture, and learning needs and preferences in designing online learning (e.g., Rao, 2012; Rudestam & Schoenholtz-Read, 2010). Using UDL assists instructors to meet diverse learners' needs and preferences. Designing and facilitating online learning based on UDL aims to reach all learners through empowering them to select the appropriate method that suits their learning preferences and needs while maintaining high expectations for all learners. Implementing UDL in an online learning environment needs effective planning, preparation, ongoing support, and assessment to achieve desired outcomes and expectations.

Once again, little is known about how instructors increase their teaching capacity to use UDL effectively in online learning, and how their academic leaders support their development

process. Most of the literature about UDL in the online higher education context is descriptive in nature, focusing on how UDL would be implemented. In particular, the literature lacks consideration about how instructors develop their expertise to implement it and what the role of academic leaders is in such implementation (Rao & Tanners, 2011; Rao, 2012; Rao, Edelen-Smith, & Wailehua, 2015). Investigating such issues would provide valuable information for higher education institutions to better provide resources and support the development of teaching capacity. Further, development providers and online instructors would benefit as such research would provide them with insight to create innovative online learning environments that are accessible and inclusive.

The Research Purpose

The research aimed to explore how instructors develop their teaching capacity to implement UDL in designing and facilitating online learning, and how their academic institution represented by academic leaders and educational development providers support them. The study explored the following: 1) The nature of support and resources required for developing online teaching capacity to implement UDL principles; 2) The key factors needed to design a flexible online learning environment that meets UDL principles; 3) The types of challenges that may influence online instructors in using UDL principles; and 4) Recommendations to support and guide instructors and institutions to develop their online teaching capacity to integrate UDL principles in their teaching and learning approach.

Research Questions

The study was guided by one main research question and three sub-questions:

- How do instructors develop their capacity to design and facilitate online learning using UDL principles?
 - What is the role of academic institutions (e.g., leaders, instructional designers, and development providers) in supporting online instructors to effectively integrate UDL principles into their teaching and learning approach?
 - What structures and scaffolds are required to support UDL implementation in online learning?
 - What key factors need to be in place to design a flexible online learning environment that meets UDL principles?

Rationale for the Study

UDL provides a blueprint for instructors to design learning environments to meet diverse learning needs and preferences. UDL aims to eliminate potential learning barriers in the early stages of designing a more inclusive learning environment (Burgstahler, 2008). In such learning environments, learners can select methods and tools that best suit their own learning preferences (Morra & Reynold, 2012).

UDL has been implemented successfully in higher education learning (e.g., online courses, face-to-face courses, and blended courses). Through designing inclusive and multimodal learning environments, “Universal Design for Learning holds the potential to ameliorate some of higher education’s most pressing issues, including the intractably low rates of persistence, retention, and degree completion evident at most colleges and universities today” (Davies, Schelly, & Spooner, 2013, p.195).

UDL integration in higher education is a complex process, however. It requires collaborative efforts from instructors, students, academic leaders, and development providers to achieve its goal. Meyer et al. (2014) argued that successful implementation of UDL needs an expert learning system that is motivated enough to assist its members with necessary support and resources. How does an expert system evolve? How should instructors be supported to implement UDL effectively? How do instructors increase their capacity to integrate UDL in their teaching? Such questions need to be explored to put theory into practice.

Empirical research on UDL implementation in higher education is still in its early stages. Based on systematic reviews of empirical research on UDL conducted by Rao, Ok, and Bryant (2014) and Al-Azawei, Serenelli, and Lundqvist (2016), eleven published empirical studies were identified that focused on higher education. Despite the National Center on Universal Design for Learning (2011)'s recommendation that researchers investigate the applications of UDL within learning environments—such as the necessary conditions required for implementation, lessons learned, and challenges faced—my review of the literature did not find research that investigated how instructors increase their teaching capacity to implement UDL in online learning environments. Examining such phenomena would assist higher education prepare and support their online instructors to provide an inclusive learning experience. Therefore, my study responded to a significant gap in the UDL implementation research by examining a group of online instructors' practices in terms of developing their teaching capacity to implement UDL and exploring the role of their institution, as represented by academic leaders and development providers, in fostering UDL integration.

Significance of the Study

Although several scholars strongly recommended incorporating UDL into higher education teaching and learning approaches (e.g., Burgstahler, 2013; Gradel & Edson, 2010; Rose, Harbour, Johnston, Daley & Abarbanell, 2006; Rao, 2012), limited research has been conducted to inform our practice. Most of the research conducted on UDL implementation is descriptive in nature (Smith, 2012), for example, describing how UDL principles would be applied in a learning environment, with limited attention being paid to methods of increasing teaching capacity to integrate such a framework effectively. Therefore, the study was significant, as it responded to the literature gap on UDL implementation in higher education through the involvement of multiple stakeholders (i.e., instructors, academic leaders, and development providers) to share their experiences in increasing online teaching capacity.

Findings from the study benefit online instructors and instructional designers as they explore different ways of increasing their capacity and fostering UDL implementation in online learning environments. In addition, the study provides insight for higher education institutions in preparing and supporting their online instructors in their development practices. The research aimed to contribute to the body of knowledge about UDL integration into online teaching and learning approaches.

Theoretical Framework

Exploring the development of online teaching capacity to use UDL involved examining instructors' learning process, such as how knowledge had been created regarding teaching online based on the UDL approach and how learning and or development processes were facilitated. Learning can be defined as "...a change in performance or performance potential...as a result of

the learner's experience and interaction with the world" (Driscoll, 2005, p. 9). Using this definition, people (e.g., instructors) construct knowledge through interaction with others, resulting in changed understanding and/or practice (e.g., method of online teaching).

Interactions such as sharing experiences, presenting perspectives, and negotiating ideas, provide a great opportunity for learning. Meaningful learning has five characteristics: "active, constructive, intentional, authentic, and cooperative" (Jonassen, Howland, Marra & Crismond, 2008, p.7). Learning is an active process in which learners interact with their environment, manipulate the objects, observe outcomes, construct interpretations, and then share those interpretations with others (Jonassen et al, 2008). Therefore, to deeply understand the complex phenomenon of how online teaching capacity could be developed to implement UDL framework, social constructivism was chosen as a theoretical framework.

Constructivism. The constructivist view of learning is that learning is "an active process of constructing rather than acquiring knowledge"; further, "instruction is a process of supporting that construction rather than communicating knowledge" (Duffy & Cunningham, 1996, p.171). Two main types of constructivist learning theory are: 1) cognitive constructivism, which "focuses on individual constructions of knowledge discovered in interaction with the environment" and 2) social constructivism, which focuses on individual construction of knowledge through social interaction with others (e.g., conversation and dialogue) (Bonk & Cunningham, 1998, p.32). For this study, social constructivism was used.

Social constructivism. Social constructivism was formulated by Vygotsky (1978) who theorized that the process of cognitive development occurs because of social interaction. His theories of the *zone of proximal development* (ZPD) and the *more knowledgeable other* (MKO)

play a critical role in explaining the social constructivist learning process. The ZPD and MKO identify “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers” (p. 86). Through interaction and collaboration with others, learners “challenge what is known, enhance connections with existing knowledge and build new pathways for additional ideas” (Bryan & Bates, 2015, p.17).

Learning occurs in two stages: first it occurs through interaction with others in the social stage, and then it internalizes in the individual stage (Vygotsky, 1978). Through the social stage, people engage in dialogue that results in knowledge construction. To define dialogue and differentiate it from discussion through the lens of social constructivist, Doolittle (2001) explained:

It is imperative to stress that dialogue does not imply simple discussing and telling, but rather, includes the analysis of ideas, the synthesis of verbal sources, the evaluation of the intersection of multiple sources, and reflective explanation of one’s own thoughts and understandings. (p. 512)

Through dialogue, learners engage in the learning process by analyzing, synthesizing, and evaluating ideas to construct knowledge within a social environment. Therefore, learning is a social activity whereby “meaning is constructed through communication, collaborative activity, and interactions with others” (Swan, 2005, p.5).

Social constructivist learning theory has been used to inform the educational development approach (Ssentamu, 2013). Instructors in an educational development opportunity share their knowledge and skills with others “manipulation of concrete materials to practice what

they have learnt, sensing progress in what they are learning, and perceiving linkages between what they know and what they are learning,” informed by the social constructivism theory of learning (Ssentamu, 2013, p.128). In such learning environments, instructors “can articulate their understandings and interpretations of problems, as well as examine these problems from multiple contexts and viewpoints” (Lock, 2006, p. 669).

Pritchard and Wollard (2010) highlighted that, from a social constructivist perspective, “...the people around the learner have a central role in learning; the people around the learner influence, sometimes deeply, how the learner sees the world; and certain tools affect the way in which learning and intellectual development progresses” (p. 35). Using the social constructivist theoretical framework helped the researcher analyze online instructor development practices. Specifically, this framework helped in the examination of the online instructors’ process in developing their teaching practice, and in exploration of the role of their academic leaders in supporting such development.

The Researcher’s Background

Subjectivity in social science research has been a controversial issue. Subjectivity refers to a researcher’s feelings, perspectives, experiences, and/or background that influence his/her view of the world and how s/he interprets it. Various interpretations of the same data gained through qualitative research can occur, based on the researchers’ subjectivity. It is important, therefore, to describe my personal worldview and experience regarding the context of my research.

My point of view is that effective learning is socially constructed through interaction with others. Through interaction, people confirm understandings, solve misunderstandings, and seek help when clarification is warranted.

I have limited experience in preparing academics who are willing to navigate online teaching; I co-facilitated the online teaching program (four weeks) offered by the University of Calgary for faculty members, instructors, and graduate students to prepare them for online instruction. This experience contributed to my knowledge about what online instructors need to know to design and facilitate online learning effectively in terms of technology and pedagogical knowledge. In addition, I conducted my Master's research on online learning by observing online students' and instructors' interactions and examining their perceptions and experience toward collaborative learning in such an environment. This research deepened my knowledge in terms of designing an engaging online environment to foster collaborative learning, identifying the factors that influence social presence in an online learning environment, and understanding how online instructors build their presence to influence students' learning and satisfaction.

Furthermore, in terms of UDL implementation, I worked with a group of faculty members and graduate students in a two-year grant project to redesign an online learning environment based on UDL principles for pre-service teachers. This project enhanced my understanding of how UDL would be transformed from theory to practice. The project further explored how UDL could be used to overcome some online learning issues such as providing multiple options of expressions and representations to reach variable learning needs and preferences. These experiences may influence my interpretations of this study.

The Researcher's Assumption

Three assumptions underlie this study:

First, instructors who teach online best learn innovative teaching and learning approaches through interactions and collaboration with their peers within a supportive community. Through collaboration, instructors would have an opportunity to present their perspectives, negotiate their ideas, clarify misconception, confirm shared understanding, and share their success as well as failure stories to inform future practice. Incorporating UDL into online teaching and learning approaches is a complex process that requires the provision of sufficient resources and generous support, and encouragement, at multi-level. Within a supportive community that includes academic leaders, instructors, and development providers, interaction and collaboration occur to expand knowledge and/or develop practices by confirming understanding, solving misconceptions, exchanging resources, seeking help, providing feedback, and/or measuring performance.

Second, every person within a program, faculty, and institution has a unique interpretation of his or her experience. For example, people involved in the online UDL-based program (e.g., instructors, academic leaders, development providers) would have variety of interpretations of the UDL integration experience (e.g., strengths, weaknesses, challenges, support, preparation, implementation, outcomes, etc.).

Third, people involved in the UDL-based program designed and taught the program for more than two iterations. I assumed that they have sufficient knowledge of UDL that would inform my research and provide insights for future practice.

Definition of Key Terms

- **A Community of Practice** is a group of people who share a common interest or concern for something they do and learn how to do it better through regular interaction (Wenger, 1998).
- **Higher Education** is a type of education offered at post-secondary institutions such as a university or college. Four awards for academic achievement are possible: a diploma or bachelor's, master's, and doctoral degrees.
- **Online Learning** is “the use of Internet to access learning materials; to interact with the content, instructors, and other learners; and to obtain support during the learning process in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience” (Ally, 2008, p.17).
- **Teaching Expertise** “implies knowledge about learning and teaching from both evidence-based sources and experiential learning” (Taylor & Colet, 2010, p. 144).
- **Building Teaching Capacity** refers to “a policy, strategy, or action taken that increases the collective efficacy of a group to improve student learning through new knowledge, enhanced resources, and greater motivation on the part of people working individually and together” (Fullan, 2007, p.58).
- **Universal Design** is “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Mace as cited in Center of Universal Design, 2008, para.1).

- **Universal Design for Learning (UDL)** is “a set of principles for curriculum development that gives all individuals equal opportunities to learn” (National Center on Universal Design for Learning, 2014, para. 1).

Organization of the Dissertation

The dissertation is organized into six chapters. Chapter Two begins with a review of the literature starting with teaching in higher education and online learning. This section is followed by a review of UDL in higher education context including its concepts and research. Chapter Three involves a discussion of the research design and presents the research methodology and methods of data collection and analysis. Chapter Four presents the findings from the data analysis represented by themes and sub-themes. Chapter Five comprises a discussion of the findings in relation to the research questions. Chapter Six outlines implications for practice, recommended areas for future research, and concluding remarks. Appendices include semi-structured interview questions.

CHAPTER TWO: LITERATURE REVIEW

This chapter examines literature on UDL in the context of higher education. The review of the literature starts with a brief description of teaching in higher education generally, then explores online learning to present a broad overview of its nature including online learning definitions, communication, community, and instructor presence. Educational development for online instructors is discussed followed by the supportive factors that influence online learning success. UDL is then examined including its concepts, implementations, and UDL-focused empirical studies in higher education. Finally, the section concludes with an assessment of the need for further research.

Teaching in Higher Education

Teaching in higher education is a complex process that involves multiple responsibilities to reach desired learning outcomes: for example, designing learning tasks, managing course expectations, assessing student learning, providing assistance, and interacting with learners.

Fink (2008) identified four fundamental tasks for teaching: 1) Knowing about the subject matter; 2) Designing the learning experience; 3) Interacting with students; and 4) Managing courses. In addition, he proposed two more characteristics that distinguish quality of teaching: 1) Using multiple pedagogical methods to increase students' learning quality; and 2) Continuously develop teaching expertise.

Hénard and Roseveare (2012) defined quality teaching as the use of pedagogical methods “to produce learning outcomes for students” (p.7). The pedagogical methods include designing an effective curriculum, selecting appropriate course content, using multiple methods of learning context (e.g., collaborative learning, individual learning, project-based learning, etc.), and

providing formative and summative assessments for students (Hénard & Roseveare, 2012).

Therefore, quality teaching involves expertise in both subject matter and pedagogy to design and facilitate a learning process that guides students to accomplish desired outcomes.

Kreber (2002) classified quality teaching in higher education as encompassing three categories: excellence in teaching, expertise in teaching, and the scholarship of teaching. First, excellence in teaching refers to the effective and successful performance of teaching, such as preparing courses, motivating learners, offering interesting learning materials, and supervising students (Kreber, 2002). Excellent instructors construct their knowledge from their own teaching experience and sometimes through educational theories that inform their practices (Kreber, 2002).

Second, expertise in teaching refers to the continuous development of teaching to be even more effective through “self-regulated learning” (Kreber, 2002, p.12). Expertise in teaching requires strong internal motivation to monitor the continuous development over time. Expert instructors construct their knowledge from declarative knowledge (e.g., educational theory), procedural knowledge (e.g., how to teach), and implicit knowledge (e.g., how to self-regulate their learning) (Kreber, 2002).

Third, scholarship of teaching refers to sharing knowledge and the practice of teaching and learning with others (e.g., faculty development opportunities, conference presentations, teaching portfolios, and peer-reviewed publications) (Kreber, 2002). Scholars construct knowledge about teaching from “declarative knowledge, procedural knowledge, and implicit knowledge of teaching and learning and the discipline”; they then validate their knowledge through peer-review venues (Kreber, 2002, p.18). As Shulman (2000) explained:

We develop a scholarship of teaching when our work as teachers becomes public, peer-reviewed and critiqued, and exchanged with other members of our professional communities so they, in turn, can build on our work. These are the qualities of all scholarship. (p.50)

The scholarship of teaching is not an aim for all instructors. Some prefer to expand their knowledge in their own disciplines, while few choose the teaching scholarship (Kreber, 2002). The challenge in higher education is the limited pedagogical preparation for teaching in comparison to research preparation due to the “prevalent assumption that a good researcher is also a good teacher” (Scott & Scott, 2015, p. 4). As one participant in Scott and Scott’s (2015) study explained:

[Y]ou cannot assume that just because you have a PhD in [the discipline] that you are automatically a great teacher; sure it helps to have a clear idea of what you are teaching and to be able to answer questions...but you are still likely to be a boring presenter, and not know or be able to use different techniques to engage the students. [A]ssessment can be really poor so that you’re unfair to students. (p. 9)

Scott and Scott argued that “without formal pedagogical preparation, university academics are distinctly disadvantaged in meeting the ‘high quality teaching’ expectations of university administrators and students” (p. 4). In their mixed-method study in a Canadian university, they identified faculty members’ perceptions of teaching and learning, their opinions of the university’s recognition and rewards for quality teaching, and their preferences for educational development. A questionnaire and various interviews were used for data collection; 231 academics responded to the questionnaire and 50 academics participated in interviews.

Participants were from different faculties (i.e., Science, Art, Business, Education, Engineering, Medicine, Nursing, Environmental Design, Kinesiology, Law, Social Work) across the university, and participants were varied in their academic designation (i.e., an associate professor, assistant professor, senior instructor, instructor, lecturer). Findings from the study included the following:

- 96 percent of participants perceived that being a good teacher is a priority for them, in comparison to research priority, which was slightly less (85 percent of respondents).
- 80 percent of participants disagreed or strongly disagreed that teaching is valued as much as research at the university.
- 50 percent of participants agreed that good teaching is recognized by their faculties.

Additionally, the participants identified some barriers to good teaching such as lack of time to develop teaching practices, limited opportunities for discipline-specific teaching development, and absence of appropriate data from student feedback. Based on these findings, Scott and Scott (2015) developed a model for educational leaders and administrators to guide them in fostering quality teaching. The model consisted of seven key points:

- Visionary leadership for quality teaching and learning: creating coherent and cohesive policies and structures.
- Reward and recognition of quality teaching: designing reward policies and providing recognition opportunities to emphasize the institutional and personal importance of pursuing quality teaching.
- Performance review: using student and expert feedback to identify strengths and weaknesses, and thus enhance teaching performance.

- Provide pedagogically-focused academic development opportunities: both central and faculty/discipline-based workshops and resources, as well as inviting pedagogical experts for consultation.
- Resourcing of teaching and learning infrastructure: technological tools for teaching, service quality, and having safe and comfortable rooms, labs, and facilities.
- Creating a collaborative culture to reflect on teaching and learning practices, remove barriers, review the currency and relevancy of courses and instructional strategies, and/or adopt a new and innovative paradigm.
- Promote systematic reflection and implementation of change and innovation.

Instructors need to be supported to increase their teaching capacity, so they are better able to recognize learning needs of students, acquire pedagogical knowledge, share knowledge in an academic community, and be recognized and rewarded by their institution (Taylor & Colet, 2010). Increasing teaching capacity in higher education is a “multi-level endeavour” (Hénard & Roseveare, 2012, p. 7). People from multiple levels need to communicate and collaborate effectively to create a vision and strategic plans to increase teaching capacity.

Changing the culture of teaching in higher education from the traditional to adaptation of a new paradigm is challenging. Palmer, Zajonc, and Scribner (2010) explained that transformative conversations could be used to facilitate changing the culture of teaching. Transformative conversation within a trust community leads to a real change. Building a trust community in which members feel safe to present their ideas, negotiate their perspectives, and share their stories is the first step toward a change (Palmer et al., 2010). Conversation in such a community evolves from cultivating members to share their stories, to generate ideas, to take

actions (Palmer et al., 2010).

Sharing stories assists in building a trust community as “the more one knows about another person’s story, the less one is able to dislike or distrust” (Palmer et al., p.139). Therefore, Palmer et al. (2010) recommended that members are asked to share their stories related to the subject matter at the beginning of conversations. Transformative conversation requires open, honest, and focused dialogue to move toward the next step (Palmer et al., 2010). Interestingly, Palmer and his colleagues found that outcomes of a transformative conversation between colleagues could be disseminated beyond the campus through sharing ideas and practice in public (e.g., conference, faculty meeting, teaching portfolios, and the Internet).

One aspects of teaching in higher education is online learning. The following section provides a review of the literature on online learning including its concept, practice, and research.

Online Learning

Introduction. The concept of online learning is not new; it has its roots in distance education that began in 1873, first via the postal service, followed by radio and educational television for presentation of content/instruction (Bullock, Gable, & Mohr, 2008). Through the evolution of technology, distance learning evolved to be more interactive as learners can communicate effectively with instructors and peers for learning. Different terminologies have been used for online learning including terms such as e-learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, and web-based learning (Anderson, 2008). For this research, the term *online learning* is used.

Online learning was defined by Harasim (2012) as “the use of online communication networks for educational applications such as course delivery and support of educational projects, research, access to resources, and group collaboration” (p. 27). Ally (2008) provided more specific description of online learning:

The use of Internet to access learning materials; to interact with the content, instructors, and other learners; and to obtain support during the learning process in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience. (p. 17)

Cheawjindakarn, Suwannatthachote, and Theeraroungchaisri (2012) described online learning similarly to Ally (2008) regarding online learning facilitation. They described online learning as a combination of courses delivered through the Internet where learning is facilitated by instructors, and content and educational tools are accessible for learners. Allen et al. (2016) further stated that online learning delivers more than 80 percent of its content and instruction

online rather than in a face-to-face environment. In summary, online learning refers to the inclusion of the Internet for interaction with content, peers, experts, and/or instructors for the purpose of learning.

Communication. One of the basic components of an online learning environment is the Learning Management System (LMS) that hosts course content, enables instructors to manage their courses, and allows multiple types of interaction to occur between and among instructors, students, content, and technology. LMS is the online learning environment that supports teaching and learning activities. Some LMSs enable instructors to create course content, upload materials, assess assignments, monitor student participation, post announcements, and communicate with students publicly and privately. Additionally, LMSs allow students to submit their learning tasks, participate in discussions, communicate synchronously and asynchronously with others, and track their learning progress through checklist features and self-assessment tools.

Some LMSs are more advanced as they permit the use of multimedia (e.g., graphic, audio, video) to present information and demonstrate knowledge in multiple ways. The use of multimodal features of communication tools such as audio and video enable instructors and students “to communicate emotion, personality, and other non-verbal cues conducive to better understanding and interpretation of meanings” (Ching & Hsu, 2013, p.311). Each type of communication tools has its own attributes that influence student engagement, social presence, community building, and student satisfaction (Bolliger & Armier Jr, 2013).

Two types of communication forums could be used in online learning: synchronous and asynchronous. Incorporating both synchronous and asynchronous communication in the design

of online learning is recommended because of their complementarity (Altowairiki, 2013; Palloff & Pratt, 2007; Rockinson-Szapkiw, Baker, Neukrug, & Hanes, 2010).

Rockinson-Szapkiw et al. (2010) conducted causal comparative research of 347 American undergraduate and graduate students to determine the influence of synchronous and asynchronous communication forums on social presence, cognitive presence, teaching presence, and perceived learning. In their study, 273 students were enrolled in completely online asynchronous courses; and 74 students were enrolled in online courses that used both asynchronous and synchronous discussion forums. A survey, which combined the Community of Inquiry Framework survey (Arbaugh et al., 2008) and the Perceived Learning Instrument (Richmond, Gorham, & McCroskey, 1987), paired with open-ended questions related to students' experience in these online courses, was used for data collection. The findings concluded that students who used both synchronous and asynchronous communication forums had a higher level of social presence than students who only used asynchronous communication forums. The lack of synchronous communication did not affect cognitive presence, instructor presence, or perceived learning.

Similarly, Altowairiki (2013) found that of lack of synchronous sessions might affect social presence, such as a sense of belonging. Altowairiki conducted a multi-case study to examine online collaborative learning in two graduate courses over 13 weeks. The first case study involved twenty-three students enrolled in an online Master's level course; four of them consented to participate in the study. Asynchronous and synchronous communication formats were used. In terms of synchronous sessions, four Elluminate *Live!* sessions were conducted during a 13-week semester. The second case study involved ten students enrolled in an online

Master's level course; four of them consented to participate in the study. Asynchronous and synchronous online discussion forums were used. Two Elluminate *Live!* sessions were conducted during a 13-week semester. Instructors for both courses participated in the study.

Participants in the first case did not report any data regarding the use of synchronous discussion forums except for the instructor who, based on his extensive research experiences, suggested having synchronous discussions along with asynchronous discussion forums for undergraduate students every week and for graduate students every two weeks.

Students in the second case reported a lack of synchronous discussion since there were only two sessions during the course. According to one participant student, synchronous discussions did not affect the quality of learning but, rather, influenced their sense of belonging. She reported, “our human need to be a part of a group, a part of that community and a sense of who our peers are and where they’re coming from...so you have that sense of empathy for each other” (p. 78).

Therefore, the use of both modalities of online learning—synchronous and asynchronous—is recommended to create a “communication-rich learning context” (Anderson, 2008, p. 274). The use of synchronous discussion assists in building social presence, such as a sense of belonging, while the use of asynchronous discussion provides flexibility for students to participate at any time, based on their convenience and schedule. By understanding the affordances of technological communication tools, online instructors would be in a better position to integrate them in a thoughtful way.

Community. Community in online learning plays a critical role on student satisfaction, retention, and learning outcomes as it reduces the feeling of isolation (Drouin & Vartanian, 2010;

Rovai, 2002; Wilson, Ludwig- Hardman, Thornam, & Dunlap, 2004). A strong sense of community in online learning environments “supports students both socially and cognitively” (deNoyelles, Zydney, & Chen, 2014, p.154).

Palloff and Pratt (2007) explained that “learning community in an online course allows for mutual explorations of ideas, a safe place to reflect on and develop those ideas, and a collaborative, supportive approach to academic work” (p.26). Also, a sense of community is essential for collaborative and deep learning (Garrison & Arbaugh, 2007). Through interaction and relationships, a sense of community is developed. Lock (2003) stated, “community is not a product or entity that can be built. Rather, it is a process that is organic in nature...[I]t depends on relationships” (p.12). Therefore, it is recommended to design learning activities that enable students to interact formally and informally to build social relationship that develop a sense of community (Garrison, 2011).

One of the theoretical frameworks that could be used to create and maintain a community in online learning is the Community of Inquiry (CoI), by Garrison, Anderson, and Archer (2000). The CoI framework provides a blueprint for online instructors to create a deep and meaningful learning experience through the development of three interdependent elements (social presence, cognitive presence, and teaching presence) (Garrison, 2011). Swan et al. (2008) also described the CoI as “a process model that provides a comprehensive theoretical model that can inform both research on online learning and the practice of online instruction” (p.1). Each element of CoI reflects a type of interaction of online learning: social presence reflects student-student interaction, cognitive presence reflects student-content interaction, and teaching presence reflects student-instructor interaction (Danaher, Hickey, Brown, Joan, & Conway, 2007).

Social presence is “the ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities” (Garrison, 2009, p.15). Social presence is a critical factor for creating a community in online learning “as it is the basis for meaningful interpersonal communication and relationships, which enables learners to share knowledge during the learning process” (Ryman, Burrell & Hardham, 2009). Social presence has been identified as a key factor that influences online student satisfaction and learning outcomes (Garrison & Arbugh, 2007; Garrison, Cleveland-Innes, & Fung, 2010; Leong, 2011, Richardson & Swan, 2003). The goal of establishing social presence is to create a trusting environment in which students feel comfortable to interact and collaborate effectively (Garrison, 2011). Although social presence does not cause collaboration, it influences students’ attitude toward collaboration (Weinel, Bannert, Zumbach, Hoppe, & Malzahn, 2011).

Cognitive presence refers to “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse” (Garrison & Arbaugh, 2007, p.161). From a social constructivist point of view, cognitive development is dependent on social interaction and collaboration with “more capable and knowledgeable others” (So & Brush, 2008, p.320). Therefore, careful consideration needs to be given to the design and facilitation of learning tasks, as meaningful collaborative activities lead to a deeper level of learning (Akyol & Garrison, 2011). The design of learning tasks and teaching presence is the most important factor in reaching a deeper level of learning (Garrison, 2011, p.53).

Teaching presence refers to “the design, facilitation, and direction of cognitive and social process of the purpose of realizing personally meaningful and educationally worthwhile learning

outcomes” (Anderson, Rourke, Garrison & Archer, 2001, p.5). Based on CoI, teaching presence involves three categories: 1) Instructional design and organization refers to the planning and design phase of learning tasks, interactions, and assessment; 2) Facilitating discourse refers to the process of maintaining student interest, motivation, and engagement in active learning to construct collaborative knowledge; and 3) Direct instruction refers to the provision of intellectual and scholarly leadership through sharing the subject matter knowledge with students.

According to Garrison (2011), effective teaching presence in an online environment is needed to establish a supportive climate for collaboration. Teaching presence has been linked to student satisfaction, perceptions of learning, and sense of community (Akyol & Garrison, 2008; Shea, Li, Swan, & Pickett, 2006). For example, Akyol and Garrison (2008) and Shea et al. (2006) found that students who reported high levels of teaching presence perceived higher level of perceived learning and satisfaction.

Students also should have a role to play in building teaching presence (Redmond & Lock, 2006). Thus, the term “teaching presence” was used instead of “teacher presence” to emphasize the possibility of distributing the responsibilities and roles of teaching among online participants (Akyol, Garrison, & Ozden, 2009). Accordingly, some scholars (e.g., Arlien, 2016; Oyarzun, Conklin, & Barreto, 2017; Richardson, Koehler, Besser, Caskurlu, Lim, & Mueller, 2015) used the term “instructor presence” to reflect on the social aspect of online instructors.

Instructor presence. This term refers to “the specific actions and behaviours taken by the instructor that project him/herself as a real person...[it] would fall at the intersection of teaching presence and social presence within the CoI framework” (Richardson et al., 2015, p.259). Specifically, instructor presence is about the human aspect of teaching as an instructor

shows empathy and concern about students (Arlie, 2016). Building instructor presence “doesn’t just naturally happen...[it] is a result of awareness, understanding, involvement through experience, and intentional planning and design on the part of the instructor” (Lehman & Conceição, 2010, p.4).

Several tactics could be used to establish instructor presence including posting weekly announcements, participating regularly in weekly discussion, providing virtual office hours, responding in a timely manner to email, providing feedback on student’s performance, modeling desired expectations, and acknowledging student interaction and contribution (Altowairiki, 2013; Pallof & Pratt, 2007). It has been found that instructor presence has an influence on student satisfaction, sense of connectedness, and engagement (Altowairiki, 2013; Lear, Isernhagen, & LaCost, 2009; Shea et al., 2006). Online instructors are recommended to build their presence not only by being online, but also through establishing educational social relationships with their students (Oyarzun, Conklin, & Barreto, 2017).

Educational Development for Online Teaching

Introduction. The success of online learning requires sufficient preparation and ongoing support for online instructors to effectively develop their teaching capacity. Johnson et al. (2014) argued that a key challenge for effective online teaching is lack of sufficient support, which resulted on “low digital literacy” by instructors. Meyer (2013) explained that educational development for online teaching needs to be shifted from learning about technological tools to focusing on pedagogical technique and instructional design to promote learning. Online teaching is complex, requiring an understanding of the relationship between technology and pedagogy to promote student learning (Anderson, Barham, Northconte, 2013; Benson & Ward, 2013;

Koehler, Mishra, Hershey, & Peruskiet, 2004; Schmidt, Tschida, & Hodge, 2016; Taylor & McQuiggan, 2008; Vaill & Testori, 2012). Effective preparation and support enable online instructors to teach “WITH the technology rather than just be able to use the technology” (Jaibal, Figg, & Burson, 2012, p.4714).

Technological Pedagogical Content Knowledge (TPACK) model could be used to identify the complexity of required knowledge. This model was developed by Mishra and Koehler (2006) to outline the required types of knowledge that instructors need to gain to effectively integrate technology in teaching and learning approaches such as online teaching. Based on the TPACK model, the essential types of knowledge are:

- Technological Knowledge (TK), which refers to understanding of technological tools and resources to facilitate teaching and learning;
- Pedagogical Knowledge (PK), which refers to methods, processes, and practices of teaching and learning; and
- Content Knowledge (CK), which refers to the subject matter that is to be taught.

Additionally, four overlapping areas represent combined types of knowledge:

- Pedagogical Content Knowledge (PCK), which reflects the connection between subject matter and instructional design;
- Technological Content Knowledge (TCK), which reflects the selection and use of specific tools to address subject matter;
- Technological Pedagogical Knowledge (TPK), which reflects the understanding of technology affordance on teaching and learning; and

- Technological Pedagogical Content Knowledge (TPCK), which reflects “good teaching with technology” (Mishra & Koehler, 2006, p.1031).

Online instructors need to understand the relationships between and among each area of the TPACK model. For example, online instructors need to identify which specific technological tool is appropriate for delivering specific learning content and is suitable for a particular audience (Januszewski & Molenda, 2008). Having a high level of TK and using a variety of technology does not ensure online teaching and learning success. Moreover, learning TK in isolation may have a negative impact on an instructor’s ability “to see the complex application of that technology in a pedagogically and contextually sound manner” (Benson & Ward, 2013, p. 170).

The review of the literature revealed several critiques of TPACK. Most of the critiques focused on the theoretical aspect of the model. For example, Graham (2011) noted that the TPACK model “is easy to understand at a surface conceptual level,” but it is complicated to understand its constructs deeply due to their “fuzzy boundaries” (p.1955). Accordingly, it was challenging to develop and validate an instrument that measures TPACK constructs (Graham, 2011). Angeli and Valanides (2009) argued that the boundaries between some of the TPACK components such as “what they define as Technological Content Knowledge and Technological Pedagogical Knowledge are fuzzy, indicating a weakness in accurate knowledge categorization or discrimination, and, consequently, a lack of precision in the framework” (p.157). Another critique was related specifically to TK, as it is inaccurately defined (Graham, 2011). Correspondingly, some researchers attempted to limit the scope of TK based on their research

context; the term ICT-TK, for example, reflected digital technology knowledge (Angeli & Valanides, 2009; Voogt, Fisser, Pareja, Roblin, Tondeur, & Braak, 2013).

The TPACK model had been used extensively in the K–12 context with much attention being given to measure teachers' TPACK knowledge; limited consideration has been taken to application of TPACK in higher education contexts (Benson & Ward, 2013). Despite these critiques, the TPACK model holds the potential to guide educational development providers in increasing online teaching capacity through equipping online instructors with sufficient knowledge and skills (Alsofyani, Aris, & Eynon, 2013, Carter, 2014). As Harris, Mishra, and Koehler (2009) highlighted,

TPACK...may be helpful to those planning professional development for teachers by illuminating what teachers need to know about technology, pedagogy, and content and their interrelationships. The TPACK framework does not specify how this should be accomplished, recognizing that there are many possible approaches to knowledge development of this type. (p. 403)

Designing an effective educational development opportunity is key to support online teaching. Little is known about how higher education could support the development of online teaching capacity (Herman, 2012; Lackey, 2011; Taylor & McQuiggan, 2008). The TPACK model describes the complexity of knowledge required to support the development of online teaching.

Leadership for online teaching. Low administrative support influences educational development for online teaching (Johnson et al., 2014). To increase online teaching capacity, there “needs to be greater institutional support and leadership from the presidential level down to

the departmental level” (p.22). The attitude of organizational culture toward online teaching influences instructors’ motivation to develop their teaching practice (Baran & Correia, 2014). When an organizational culture recognizes and rewards online teaching, instructors are more motivated to develop their expertise to teach online (Baran & Correia, 2014).

Teaching and learning development units or teaching and learning centres represent the organization’s support for educational development within a university (Herman, 2012). The aim of teaching and learning units/centers is to increase the capacity of teaching and learning through offering multiple types of educational development opportunities, for example: designing and coordinating teaching activities, organizing assessment and evaluation procedures on quality teaching and learning, consulting with stakeholders on learning and teaching issues, supporting technology integration in teaching and learning, planning and maintaining a reward system for pedagogical initiative and quality teaching, facilitating the scholarship of teaching and learning, and disseminating evidence-based information (Taylor & Colet, 2010). From unit to unit, the emphasis on each of these dimensions are varied depending on the available resources and explicit mandates (Taylor & Colet, 2010).

Methods. Several strategies were identified to develop online teaching expertise including, but not limited to, teaching online programs, building communities of practice, and peer mentoring. Effective online teaching programs assist instructors’ transitions to online teaching and learning with desired skills, experience, and confidence necessary to provide meaningful online learning experiences for their students (Vaill & Testori, 2012). However, these programs for online instruction may fail in making key enhancements in online teaching and learning if they focus only on the technological side of online teaching (Taylor &

McQuiggan, 2008). Therefore, Schmidt, Tschida, and Hodge (2016) asserted that online teaching development programs should focus on curriculum development, pedagogy of online teaching, and technological tools. It is important to highlight that online teaching programs should not be provided only to novice online instructors; experienced online instructors need to participate in these programs to keep developing their proficiency (Vaill & Testori, 2012).

In terms of designing online teaching programs, the literature (e.g., Roman, Kelsey, & Lin, 2010; Wolf, 2006) suggested that programs should be provided in an online format in which participants initially work as learners (e.g., group work). This means that they would access the course delivery system (e.g., submit an assignment) to understand online students' needs and challenges such as fear, stress, and frustration. Then, participants gradually move toward the instructor role to learn how to design assignments, manage online discussions, and provide feedback.

A blended format has also been suggested for the design of online teaching programs to combine the best features of face-to-face and online learning environments (Vaughan, 2004). Face-to-face meetings would help participants build meaningful relationships with each other that, in turn, build a safe environment (Vaughan, 2004). On the other hand, online sessions allow participants to reflect deeply on their thoughts (Vaughan, 2004). Thus, an online teaching program could be designed in a fully online format to align with students' situations or in a blended format to marry the best features of an online environment with face-to-face encounters to build social relationships among colleagues.

One issue online instructors may face is a lack of opportunity to communicate and share ideas, experiences, and concerns with each other after attending development

programs/workshops (Vaughan, 2004). Therefore, the creation of a learning community is important for facilitation of the instructors' transition to online teaching and learning. In this teaching community, members would have opportunities to communicate, share their experiences, help each other, provide feedback, and support each other navigate the transition. Educational development for online teaching needs to be ongoing activity, "as 'shotgun' approaches often do little to promote real change" (Slavit, Sawyer, & Curley, 2003, p.35).

As an example, a community of practice (CoP) has been used commonly as a tool for educational development purposes (Baran & Cagiltay, 2010; Brooks, 2010; Carter, 2014; Farooq, Schank, Harris, Fusco, & Schlager, 2007). Schaler and Fusco (2003) stated that "teachers' professional development is more than a series of training workshops, instates, meetings and in- service days. It is a process of learning how to put knowledge into practice through engagement in practice within a community of practitioners" (p.205).

A CoP is a group of people who have a common interest and/or share a concern and interact regularly to deepen their knowledge and develop their skills; "over time, they develop a unique perspective on their topic as well as a body of common knowledge, practices, and approaches...They may even develop a common sense of identity. They become a community of practice" (Wenger, McDermott, & Snyder, 2002, p.5).

Wenger (1998) described an effective CoP as a combination of three key elements:

- Joint enterprise refers to a common interest or concern to which members in a CoP are committed.
- Mutual engagement refers to the joint activities and discussion that members engage in to support each other, exchange resources, and seek for help, as well as shared

repertoire. An effective CoP fosters “interactions and relationships based on mutual respect and trust” (Cheng & Lee, 2014, p.753).

- Shared repertoire refers to the set of resources that members share and/or develop. The repertoire of a CoP includes “routines, words, tools, ways of doing things, stories, gestures, symbols, genres, actions or concepts that the community has produced or adopted in the course of its existence and which have been part of its practice” (Wenger, 1998, p.83).

Cheng and Lee (2014) claimed that effective CoP requires meaningful facilitation in terms of content and process. Content facilitation addresses the needs of the members, encourages them to collaborate, and guides the content of activities and discussion to ensure they align with the CoP domain, develop a shared repertoire, and construct knowledge (Cheng & Lee, 2014): “Content facilitation sets the boundaries of a CoP by establishing a focus on the knowledge domain of the joint enterprise” (Cheng & Lee, 2014, p.755). Process facilitation refers to monitoring and evaluation mechanism to regulate activities and facilitated interaction to achieve desired outcomes (Cheng & Lee, 2014).

The nature of learning that evolves from a CoP is collaborative, which is greater than any individual knowledge (Johnson, 2001). Through collaboration, members of CoP present their perspectives, challenge their ideas, provide feedback, and “enhance connections with existing knowledge and build new pathways for additional ideas” (Bryan & Bates, 2015, p.17). As the *zone of proximal development* theory demonstrated (Vygotsky, 1978), individual learning could be enhanced and extended to a higher level through collaboration and interactions with the more knowledgeable other.

CoPs can be built in face-to-face or online environments. To explore the effectiveness of online CoPs for the educational development of online instructors, Carter (2014) conducted qualitative action research. Participants were adjunct online instructors from different departments at a private university in the United States. Online instructors were grouped in different CoPs based on their departments and areas of teaching to help each other and exchange resources. Each CoP had a leader to facilitate and manage peer interactions through asynchronous discussion and synchronous meetings. Data were gathered from survey, observation, focus group interviews, and artifacts. Fifteen instructors participated in focus group interviews. The results indicated that online instructors were satisfied with their experience with CoPs as these communities allowed them to self-regulate their learning, learn with and from each other, and receive direct mentorship. Moreover, these CoPs influenced remote online instructors' sense of citizenship with the university.

Another type of professional development for online teaching is peer mentoring. Mentoring requires having an experienced instructor work with novice online instructors to assist them navigate online teaching and develop desired skills. Instructors learn from mentors how to design, deliver, and assess online learning through observation and reflection (Vaill & Testori, 2012). Through peer observation, instructors provide feedback and suggestions for each other on design, delivery, and assessment; they also share the successes and challenges of online teaching (Baran & Correia, 2014). Mentoring can either be part of a formal program or develop in an informal relationship (Herman, 2012).

To examine which educational development opportunities effectively supported instructors to teach online, Taylor and McQuiggan (2008) conducted a quantitative study at

Pennsylvania State University. A survey was sent to 260 faculty members who taught at least one online course. The survey was completed by 28.7 percent of the members contacted.

Participants were asked to indicate from a list of options which type of educational development experience they would be most likely to pursue (i.e., formal face-to-face events, informal face-to-face events, formal online events, informal online events, or self-paced/self-directed materials).

Their responses were as follows: self-paced materials (42.6 percent), informal face-to-face events (41.2 percent), informal online events (33.8 percent), formal face-to-face training programs (30.9 percent), and online programs (29.4 percent). Participants also reported that the most helpful aspects of educational development for online instruction included opportunities to share real-life experiences with their colleagues, having access to specific examples and strategies, and using various technologies.

Finally, the participants identified barriers that may inhibit faculty from participating in educational development opportunities for online instruction, such as limited time to participate, lack of recognition for the purpose of promotion and tenure, lack of incentive or reward, lack of awareness about educational development opportunities, and lack of access to these developmental opportunities.

In summary, various educational development opportunities could be utilized to prepare instructors for online teaching, ranging from informal to formal learning. However, it is important to reiterate that educational development for online teaching needs to address both aspects of online teaching: pedagogy and technology (Taylor & McQuiggan, 2008).

Critical success factors for online learning. Several factors appear to influence online teaching and learning success. Cheawjindakarn et al. (2012) reviewed and analyzed 19 papers published between 2000 and 2009 to identify critical success factors for online learning in higher education. Five categories of supportive factors resulted from their content analysis. First, institutional management plays a critical role in planning, operating, and evaluating successful online learning. Online learning requires effective planning to maintain its quality and competitiveness.

Second, learning environment was considered a critical factor for online success. Learning environment refers to the location where learners access content, communicate with each other, obtain assistance, and receive feedback (Cheawjindakarn et al., 2012). Several elements need to be carefully considered to build a meaningful online learning environment including course/LMSs, technical infrastructure, online interactions (i.e., student-content, student-instructor, student-student), user-friendly access, and environment navigation (Cheawjindakarn et al, 2012).

Third, instructional design was an influential factor for online learning success. Instructional design involves, but is not limited to, clear objectives, detailed expectations, qualified relevant content, appropriate teaching and learning approaches, adequate workload and time frame, and appropriate learning assessment (Altowairiki, 2013; Cheawjindakarn et al., 2012).

Fourth, the quality of supporting services including training, communication tools, and help desk was found to influence online instructors' and learners' satisfaction and success

(Cheawjindakarn et al., 2012). Support services should be provided for both instructors and learners to ensure their competence in dealing with online communication and interaction.

Fifth, course evaluation was also considered a supportive factor for online learning, as it assists institutions to access their programs' strengths and weakness and thus enhance their performance. According to Cheawjindakarn et al., "Evaluation is the key to quality online learning, and having a plan for the process is the key to evaluation" (p.65). Effective evaluation involves multiple stakeholders' perspectives: administrators, instructional designers, instructors, and learners.

My study relates to the third supportive factor, instructional design, as its aim was to examine how online instructors increase their capacity to design and facilitate online learning in a manner that is suitable for variable learning needs and preferences. A variety of teaching and learning frameworks can be applied in online learning, including UDL, which is the focus of the current study.

Universal Design in Education

The concept of Universal Design (UD) spans a variety of fields such as engineering, architecture, and education. UD was defined as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Mace, as cited in Universal Design, 2008, para.1).

In the field of education, the aim of UD is to build a flexible learning environment that supports all learners' needs; rather than being personal, it is inclusive and universal (Rose, Harbour, Johnston, Daley & Abarbanell, 2006). Implementing UD principles does not eliminate the need for student disability accommodation, but aims to create a flexible learning environment

accessible by a variety of students to minimize the need to create individual accommodations (Burgstahler, 2013). For example, using an audio format for reading material can support a range of students, including those with visual impairments, those with learning disabilities, and those whose preference is auditory (Rao & Tanners, 2011). UD aims to remove learning barriers through initial designs that consider diversity instead of overcoming the rise of unanticipated barriers through creation of individual accommodations (Rose et al., 2006).

Incorporating UD principles in education comprises three integration models: Universal Design of Instruction (UDI), Universal Instructional Design (UID), and UDL (Rao & Tanners, 2011). The common goal of UD models is to design learning environments and instruction that are accessible for a broad range of students with respect to disability, ability, learning level, learning preferences, and other characteristics; however, each model is slightly different in focus.

The UDI model was developed by the Center on Postsecondary Education and Disability at the University of Connecticut. UDI focuses on inclusive teaching techniques to support diverse college students, including students with special needs. The model consists of nine principles as reported by McGuire, Scott, and Shaw (2006):

- 1) Equitable use: Instruction is designed to be useful to and accessible by people with diverse abilities.
- 2) Flexibility: Instruction is designed to accommodate a wide range of individual abilities.
- 3) Simple and intuitive: Instruction is designed in a straightforward and predictable manner regardless of the student's experiences, knowledge, language skills, or current concentration levels.

- 4) Perceptible information: Instruction is designed so that necessary information is communicated effectively to the student regardless of ambient conditions or the student's sensory abilities.
- 5) Tolerance for error: Instruction anticipates variation in individual student learning pace and prerequisite skills.
- 6) Low physical effort: Instruction is designed to minimize nonessential physical effort in order to allow for maximum attention to learning.
- 7) Size and space for approach and use: Instruction is designed with consideration for appropriate size and space for approach, reach, manipulation, and use regardless of a student's body size, posture, mobility, and communication needs.
- 8) Community of learners: The instructional environment promotes interaction and communication among students and between students and faculty.
- 9) Instructional climate: Instruction is designed to be welcoming and inclusive (p.390).

The UID model was articulated by the University of Guelph. The model consists of seven principles on designing instructional materials and activities to: 1) be accessible and fair, 2) be flexible, 3) be straightforward and consistent and, 4) be explicit, and on the learning environment to 5) be supportive, 6) minimize unnecessary physical effort, and 7) accommodate students and multiple teaching methods (Open Learning and Educational Support at the University of Guelph, 2016). These principles could be applied as follows (Open Learning and Educational Support at the University of Guelph, 2016):

- 1) Delivery method: Use a variety of delivery methods and teaching approaches such as lecturing, discussion, projects, cases...etc.

- 2) Learning methods: Make print materials available in electronic format and provide outlines in advance for students to be prepared for the class.
- 3) Interaction: Promote multiple types of interaction between and among students and instructors.
- 4) Feedback: Provide ongoing feedback.
- 5) Assessment/Demonstration of knowledge: Design multiple types of learning activities to allow students to demonstrate their knowledge effectively.
- 6) Physical effort and access: Ensure the learning environment is accessible to individual with a wide range of physical ability.

UDL was developed by the Center for Applied Special Technology (CAST). UDL focuses on applying UD principles to teaching and learning pedagogy, such as providing multiple means of engagement, representation, and expression. The UDL goal is to have access to learning instead of information via provision of suitable support and challenge. Rose et al. (2006) distinguished UDL principles from other UD principles as:

While providing access to information or to materials is often essential to learning, it is not sufficient. UDL requires that we not only design accessible information, but also an accessible pedagogy. In general terms, pedagogy is the science of teaching and learning—the educational methods that skilled educators use to highlight critical features, emphasize big ideas, clarify essential relationships, provide graduated scaffolds for practice, model expert performance, and guide and mentor the apprentice (or student). All of these and more are what teaching is, and the measure of their success is what we call learning. (p.2)

Although the three UD models are applicable to K–12 and higher education contexts, UDI and UID models are often associated with higher education literature, while UDL is often associated with K–12 literature (Rao, Oak, & Brayant, 2014). It is clear that there is some overlap in the UD models; what distinguishes UDL from other models is that it is supported by research in neuroscience and education to design and facilitate an accessible learning for all students in a classroom. Another distinction made by Rao and her colleagues (2014) is that UDI and UID provide “broader, less specific guidelines for lesson and curriculum design” and consider “additional factors such as student-instructor interactions, classroom environment, and accommodations” (p.154); by contrast, UDL provides more specific principles and guidelines for curriculum design. UDL is explained in-depth in the following section, as it is the focus of the current study.

Universal Design for Learning

UDL is “a set of principles for curriculum development that gives all individuals equal opportunities to learn” (National Center on Universal Design for Learning, 2014a, para.1). UDL principles are based on neuroscience research that focuses on how the brain learns “as reflected in the affective, recognition, and strategic learning networks,” and educational research that focuses on the components of effective teaching “as reflected in optimal techniques for building engagement, knowledge and skills” (Meyer et al., 2014, p.88). The combination of neuroscientific and educational research resulted in the development of three principles:

- 1) Providing multiple means of engagement;
- 2) Providing multiple means of representation; and
- 3) Providing multiple means of action and expression.

It is important to highlight that UDL is not a prescriptive checklist to be applied in every situation; rather, it is a general framework from which educators apply general principles and select tools and methods that best fit their unique situation (Meyer et al., 2014).

The UDL principles are supported by three learning networks: affective networks, recognition networks, and strategic networks. Each of these unique learning networks has a connection to effective teaching methods as outlined below.

The affective networks involve monitoring “the internal and external environment to set priorities, to motivate, and to engage learning and behavior” (Meyer et al., 2014, p.54). These networks determine whether perceived information matters or not (National Center on UDL, 2014a). Rose and Meyer (2002) described affective learning as the fuel that learners bring to the learning environment, connecting them to the “why” of learning. From the educators’ side, we ask such questions as “How do we encourage and motivate learners?”

Learners’ engagement and motivation differ; no one optimal resource of engagement ensures all learners will be engaged and motivated (Rose et al., 2006). It is essential, therefore, to have multiple sources for and options of engagement to ensure addressing a variety of learners’ preferences. Rose and Meyer (2002) suggested four teaching methods to support affective learning, including offering options in content and tools, providing adjustable levels of challenge, offering a choice of rewards, and offering choices of learning context.

The recognition networks involve perceiving information in the environment and transforming it into usable knowledge (Meyer et al., 2014). These networks identify objects and events, whether they are visual, auditory, tactile, or olfactory. Recognition learning addresses the “what” of learning, asking “What is the best way of representing information?”

Since no specific optimal method exists, educators need to provide multiple options of representation (Rose & Meyer, 2002). Learners differ in their abilities “to recognize patterns whether they are symbols on a map or formatting of a term paper” (Eberle & Childress, 2007, p.243). Rose and Meyer (2002) suggested four teaching methods to address diverse learning abilities, including providing multiple examples, highlighting critical features, providing multiple media and formats, and supporting background knowledge.

Strategic networks focus on the action of “plan, organize, and initiate purposeful action in the environment” (Meyer et al., 2014, p.54). These networks are responsible for knowing how to do things, such as writing an essay or solving a math problem. Strategic learning refers to the “how” of learning by asking “What is the best learning activity that is suitable for all learners to express what they have learned effectively?”

No one optimal option is suitable for a variety of learners. Even though they may have similar goals to accomplish, they will have different pathways for achieving these goals (Rose & Meyer, 2002). Thus, it is important to provide multiple options for action and expression. Rose and Meyer (2002) suggested four teaching methods to support strategic learning: providing flexible models of skilled performance, having opportunities to practice with supports, offering multiple ongoing and relevant feedback, and allowing flexible opportunities for demonstration and expression.

These three learning networks (i.e., affective, recognition, and strategic networks) work together throughout the learning process, although each one has its own contribution and effect (Meyer et al., 2014). The significance of using learning networks is to ensure accessible learning, defined as “providing information and informational supports that are accessible to all students,

providing ways of acting on information that are accessible to all students, and providing ways of engaging and motivating learning that are accessible to all students” (Rose et al., 2006, p.7).

In summary, UDL does not create accommodations for learners with disabilities; rather, it is a general framework for designing an inclusive learning environment that attempts to meet all learners’ needs by providing multiples means of engagement, representation, and expression. UDL reduces the need to create individual accommodations by having built-in flexibility in the learning environment design in which students select methods and tools of learning that best suit their learning preferences and needs. UDL suggests general principles for effective teaching and learning to assist instructors as they design accessible learning for all students.

Expert learning. The UDL aim goes beyond application of principles in a learning environment. Indeed, applying the three principles is the first step toward its goal, which is to assist learners, instructors, and education systems to be experts at learning. Based on the UDL context, expertise refers to “a process of becoming more expert on a continuum of development” (Meyer et al., 2014, p.23), instead of reaching a final destination. This means that expert learners, teachers, and institutions are not only those who know more than others; rather, they are those who “continually develop in the context of their professional community, the classroom, informal settings—indeed, wherever learning takes place” (Meyer et al., 2014, p.21).

Developing learning expertise requires designing a flexible learning environment to support ongoing learning at every level including institution and system, educators, and students (Meyer et al., 2014). Expert learners are motivational, resourceful and knowledgeable, and strategic and goal directed (Meyer et al., 2014). Everyone can be an expert learner if they are aware of their strengths and weaknesses and are motivated enough to work toward amplifying

strengths and eliminating weaknesses by continual formal and/or informal learning. Instructors need to become expert learners by improving and developing their teaching skills.

Meyer et al. (2014) identified two further factors that need to be in place to support learning expertise: introspection and peer feedback. These learning communities play a significant role in individual learning development. Interaction and communication provide opportunities for people to gain feedback from peers, observe others' performances, and seek help.

Instructors play a key role in modeling learning expertise such as trying new things that may not work out, asking for help, and making mistakes (Meyer et al., 2014). The benefit of such modeling is to inspire learners through observing an evolving model of developing expertise from novices through to advanced practitioners (Meyer et al., 2014). Such a learning environment requires a system that motivates and supports its members with necessary resources. Further, expert learning systems need to demonstrate "self-regulation" (Meyer et al., 2014, p.43) by setting high expectations, measuring progress, collecting feedback, and adjusting methods and tools to enhance performance (Meyer et al., 2014).

How can an expert system evolve? What are some criteria for an effective expert system? What regulations and policies need to be in place to support such a system? How might an expert system support its members to be expert in learning? What kind of infrastructures and support are required for an expert learning system? Such questions need to be investigated to better guide educational institutions to increase their teaching and learning capacity and thus support their members to become expert learners.

UDL implementation. UDL implementation is “a process of change that tends to occur in a recursive, continuously improving cycle of learning and progressing” (CAST, 2014). Successful UDL implementation requires buy-in from faculty to explore the concept of UDL and thus develop their teaching practice (Bowman, 2016). Also, institutional support is needed to create a vision and action plans to infuse UDL across faculties within the institution to become “wide-spread” process (Bowman, 2016; Goforth-Melroy, 2014).

UDL implementation has five phases as identified by CAST (2014) that may exist as discrete, separate, sequential periods of focus, or they may overlap or repeat in an iterative manner:

- 1) Explore: increasing the awareness of learner variability and UDL;
- 2) Prepare: creating vision and plan for action;
- 3) Integrate: fostering collaboration and ongoing support;
- 4) Scale: expanding effective practices and structures; and
- 5) Optimize: enhancing system- wide culture.

Ostrowski et al. (2017) discussed their two-year journey as a team of faculty members and graduate students that implemented UDL in the design of an online learning environment and then supported instructors to use UDL principles in their facilitation of online learning. Their UDL implementation process started with developing team knowledge about UDL using an academic book club approach. The book club approach had two outcomes: 1) development of a common understanding of UDL; and 2) fostering a sense of a community among and between the team members.

The team attended UDL-focused conference and invited UDL expert in the field for consultation to deeper their understanding of UDL and its application in a higher education context. Next, as an iterative design process for UDL implementation is recommended to achieve desired outcomes, they designed the online course shells through an iterative process involving multiple stakeholders (e.g., administrators, instructors, and students) to assess the strength and weakness areas to inform upcoming design iterations. In addition, the team provided multiple types of support for instructors to effectively use the designed course shells as desired. Online teaching workshops, one-on-one technology coaching, text-based documents, and videos were some of the offered support. At the end of each year, all instructors were invited to meet with the team to talk about their experiences, showcase teaching practices, and share what they learned.

How did instructors use the designed course shells based on UDL? How was online learning facilitated based on UDL? What types of challenges were faced in terms of using UDL in the facilitation of online learning? Such questions need to be addressed to deeply understand UDL integration in online learning. Designing online course shells based on UDL does not assume that all stakeholders would utilize it as desired, however (Ostrowski et al., 2017).

UDL integration requires clear understanding of UDL theory and applications. Through an iterative design process, designers/instructors would be in a better position to adhere to UDL principles. Having buy-in from individual instructors is essential to change their practice and adopt new approach. With administrative support, UDL would be more likely to success.

UDL misconceptions. Although the UDL framework was developed in 2002, several misconceptions still exist and have been discussed by several scholars (e.g., Edyburn, 2010; Rose & Meyer, 2002). Edyburn (2010) noted, for example, that “I have been in many situations

where educators, administrators, researchers, or product developers were making claims that their instructional practices are based on UDL principles, but I simply was not able to see the connection” (p.38). In my review of the literature, two main misconceptions emerged: UDL is assistive technology and UDL is just a good teaching.

The first misconception held is that UDL is assistive technology. In reality, UDL and assistive technology are two sides of the same coin (Rose, Hasselbring, Stahl, & Zabala, 2005). However, assistive technology was originally defined as a type of technology designed and provided for learners with disabilities that “increases, improves, or maintains the functional capabilities” (Rose et al., 2005, p.508) of learners to assist them overcome barriers in learning environments so as to enhance “their opportunities for independence” (p.508).

On the other hand, UDL is a type of framework that focuses on design; it aims to design an accessible learning environment for all learners regarding the pedagogical aspects (i.e., techniques, methods, scaffolds, and processes) that are embedded in learning environments and curricula (Rose et al., 2005). Incorporating technology into teaching and learning processes facilitates UDL implementation, as learners would have multiple accesses to learning (Edburn, 2010). However, using technology by itself does not imply UDL is implemented.

In summary, assistive technology is provided for learners with disabilities “reactively after a referral and evaluation of an individual student” (Edyburn, 2010, p.39); individualized. UDL, on the other hand, aims to design an accessible learning environment for all learners. It is inclusive and universal.

The second misconception is that UDL is just good teaching. For example, Edyburn (2010) noted several statements in the literature such as “universal design for learning is just

good teaching” or “many teachers are already doing UDL; they just don’t know that’s what it is called” (p.38), which reflect a fundamental misunderstanding of UDL.

Edyburn (2010) claimed “good teaching has never been able to address the full range of diversity found in a classroom” (p.38). Thus, he provided some suggestions to resolve such misunderstandings:

- 1) UDL must “be recognized as a learned skill” (p.38) that is developing over time to produce high-level performance;
- 2) Stakeholders need to be trained in UDL principles to positively influence student learning and engagement;
- 3) Define and measure UDL implementation to discern when it is being done and when it is not;
- 4) Empirical studies need to be conducted to examine how teachers/instructors develop their teaching capacity to use UDL effectively; and
- 5) Host national design competitions to create an innovative universally-designed instructional product.

Ultimately, even though UDL has attracted educators’ attention, some fundamental misconceptions have occurred. For instance, because people often believe UDL is synonymous with assistive technology, they are under the assumption that it is geared primarily to learners with disabilities. Such misunderstanding needs resolution to help educators create innovative learning environments/products that best represent UDL philosophy.

UDL Implementation in Higher Education Courses

Several examples of UDL implementation in the design of higher education courses were

identified in the literature. These examples are informative as they guide instructors who are willing to adopt UDL into their teaching and learning approaches. Three examples are discussed in this section to demonstrate how such an approach could be implemented, whether in face-to-face, blended, or online higher education courses.

Morra and Reynold (2012) in their article “Universal Design for Learning: Application for Technology-Enhanced Learning” explained the process of incorporating UDL to enhance the design of a blended course. They provided multi-formatted resources for their students (e.g., video clip, interactive website, article, etc.) to help them achieve learning tasks. Their goal was to provide an opportunity for students to interact with similar information in different modalities—the first principle of UDL. They also provided a variety of learning tasks for students to select from to express their knowledge such as tests, discussion postings, presentations, papers, making videos, or creating interactive online assignments. Additionally, students fulfilled their discussion assignments by selecting from a set of weekly online discussion topics.

Morra and Reynold (2012) provided detailed information about how each UDL principle was applied in their design. The missing element from the article was the necessary evidence of the course design’s success. For example, what were students’ perspectives toward having such variety open to them? What were the instructors’ perspectives toward the outcomes of such design in terms of what worked well and what did not? What kinds of support needed to be in place to assist instructors in the design and implementation of a blended course based on UDL?

Rose et al. (2006) in their article “Universal Design for Learning in Post-Secondary Education: Reflections on Principles and their Application” reflected on the implementation of

UDL principles in a graduate course. The authors described their process of brainstorming to design the graduate course. Initially, they assessed the goals and objectives of the course and ensured that UDL principles were incorporated. For example, one of the course goals was teaching information on a variety of topics such as neuroscience, learning in the brain, and individual differences in the way our brains learn. According to these authors, “the first principle of UDL reminds us that information must be presented in multiple ways in order for that goal to be achieved for a wide range of students” (p.8). Therefore, lecturing was primarily used, with applications of UDL solutions to overcome its limitations. For example, lectures were videotaped then posted on the course website for further review. The aim was to help students who were late or absent, whose second language was English, or who had a wide variety of language-based disabilities.

According to Rose et al. (2006), recorded lectures allowed anytime access, as well as replay opportunities to fill in gaps or to re-listen to difficult segments. Additionally, small group discussions were used to provide an opportunity for students to dig deeper in actively constructing knowledge as a supplement to the lectures. Small group discussions (face-to-face or online) were optional for students. Hence, instructors could still use their traditional lecture-based teaching approach with some modifications to overcome its limitations in meeting diverse learning needs and preferences.

Since learned information also needs to be expressed effectively as knowledge, Rose et al. (2006) provided options for students to demonstrate their learning through two separate website-construction projects: design a curriculum or create an individual unit for a specific level of students with specific abilities and skills. According to Rose and colleagues, not all students

were able to create websites on their own, creating the need for supports and scaffoldings (e.g., examples, technical tutorial, etc.). It is important to note that in this specific task, students did not have an option to use an alternate format than a website to express their knowledge. However, sufficient assistance and resources were provided.

Rose et al. (2006) relied on their observations to assess the success of the course. According to them, the course succeeded in attracting students to enroll, even though it was not a requirement for their degrees, due to the available options to make choices based on learners' needs and interests. Notably, it would be valuable if students' perspectives were involved in their papers, (e.g., what did they like about the design of the course, or what did not work, and what were their suggestions to enhance the design).

In terms of online learning, Rao and Tanners (2011) designed and delivered an online course based on UDL principles. They categorized the course elements that were UD-based:

- 1) Course material;
- 2) Instructional strategies; and
- 3) Asynchronous and synchronous technological tools.

Generally, they used different formats to represent content (e.g., written, audio, and video), gave students the option to select their preferred method of knowledge expression (e.g., writing a research paper or creating a multimedia project), and used synchronous and asynchronous discussion forms (Voicethread, Elluminate *Live!*) to facilitate students' engagement.

Questionnaires were sent to all students in the course (n=25) to assess their perceptions of the course design. Findings from the study revealed that 76 percent of the students purchased

print versions of the book, while 24 percent of students purchased a digital version. For the assigned articles, 52 percent of students read only the text, 32 percent of students concurrently read and listened to the articles, and 16 percent read some and listened to some. From the data, it can be inferred that students were interested in using different formats of content representation even though they did not have recognized disabilities—their choice of formats was related to learning preferences.

Students appreciated the design of the course based on UDL, specifically in having options to represent and express knowledge. Similarly, students also appreciated having clear outlines and expectations of the course, and receiving regular feedback.

In conclusion, UDL principles could be implemented successfully in a higher education context to build a flexible learning environment that meets individuals' needs and learning preferences. The literature demonstrated the ability of UDL to be incorporated in face-to-face, blended, and online courses.

Review of Empirical Research Conducted on UDL in Higher Education

This section analyzes empirical research conducted on the application of UDL in higher education context. A review of the literature found several key research papers. In “A review of research on Universal Design in educational models” by Rao et al. (2014), the researchers undertook a systematic review of the literature on the three models of universal design—UDL, UID, and UDI—in higher education and K–12 contexts. Two hundred articles from October 2011 to January 2012 were located. The articles were carefully reviewed based on specific criteria, including whether they were empirical studies; were conducted at K–12 or secondary level; used UDL, UDI, and/or UID as a framework; and were published in peer-reviewed

journals. Out of the 200 articles, thirteen were identified as based on the mentioned criteria; five of them were conducted at the post-secondary level.

Two studies (McGuire-Schwartz & Arndt, 2007; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007) examined the influence of receiving UDL training on pre-service teachers' practices in K–12. Another (Schelly, Davies, & Spooner, 2011) examined the effect of one hour of UDL training on a group of participating instructors' teaching approaches in higher education. Two studies (Parker, Robinson, & Hannafin, 2008; Rao & Tanners, 2011) examined students' perceptions of post-secondary level courses that were designed based on UDL and/or UDI. It is evident that empirical research on UDL in higher education contexts is still in its early stages. More research is needed to inform the practice of UDL application.

Later, Al-Azawei, Serenelli, and Lundqvist (2016) conducted a systematic review of the literature on UDL based on four criteria: peer-reviewed papers, papers with empirical results, papers that used UDL as a framework, and papers published between 2012 and 2015.

Of 55 peer-reviewed papers, 12 papers were selected based on their meeting the criteria of applying content analysis. Six of these selected papers were focused on the higher education level. Two studies (Courey, Tappe, Siker, & LePage, 2012; McGhie-Richmond & Sung, 2012) examined how candidate teachers understand and apply UDL in their lesson plans after attending a training session. One study (Davies, Schelly, & Spooner, 2013) measured the effectiveness of receiving UDL training session on instructors' teaching practice through the involvement of student perception. Other research (Smith, 2012) aimed to examine the relationship between UDL implementation and student engagement. A study by He (2014) investigated the effectiveness of designing online course based on UDL. A case study was carried out (Kumar &

Wideman, 2014) to apply UDL in an undergraduate health science course and explore student response to such a design. Some of these research papers focused on UDL implementation in higher education are analyzed in the following paragraphs.

As noted, Schelly et al. (2011) examined the effect of one hour of UDL training on a group of participating instructors' teaching approaches. Participants in the study included five instructors and 1,362 students who were enrolled in nine sections of Introduction to Psychology. Initially, students were surveyed following the first two weeks of the course to measure their perceptions toward their instructors' teaching approach. The survey was designed based on UDL principles. Then, the instructors received a one-hour training session in implementing UDL principles in a higher education context, based on the results from the pre-survey. At the end of the course, students were re-surveyed to measure the effectiveness of the training on their instructors' teaching approach. Findings from the second survey revealed that, although limited to one hour, the training had a positive impact on the instructors' teaching and thus influenced students' learning experiences. Because of the training, the instructors used different formats of representation in their teaching. The instructors also provided more formative feedback on assignments after the UDL training.

Several critiques can be made about the design of Schelly et al.'s study. For example, analyzing the instructors' teaching approach in the first two weeks of the course may not be sufficient to allow students to have in-depth knowledge of their instructors' teaching approach. Further, changes that occurred in the instructors' teaching style during the study may or may not have been a direct consequence of the training. Had the pre-survey been conducted in the middle of the course, would the same results manifest? From the study, it can also be observed that the

instructors' perspectives toward the training missed vital responses about what they learned, what they wanted to learn more about, and which aspect of the training influenced their teaching approach. Such information would be useful to inform higher education institutions on how to better design and deliver UDL professional development sessions.

Davis et al. (2013) built on their previous study (Schelly et al., 2011) in which they examined the influence of receiving UDL training sessions on instructors' teaching practice by comparing the results of control and intervention groups. Six instructors (PhD candidates) were in the intervention group and received a UDL training session along with their students (N=1,164); 386 of them completed the online pre- and post-training questionnaires. Three instructors (PhD candidates) were in the control group who did not receive any training session on UDL along with their students (N=646); 204 of them completed the online pre- and post-training questionnaires.

Both groups of instructors were mentored by an assistant professor, and had weekly one-hour Teaching Fellow meetings. In these meetings, they talked about their teaching practices and some pedagogical topics. However, only the intervention group received one-hour UDL training sessions weekly for five weeks. The training sessions involved assigned reading materials about UDL accompanied by techniques and strategies to address each of the three UDL principles.

The results indicated that the intervention group made significant changes in terms of UDL implementation from pre- to post-training questionnaire. Specifically, the researchers found seven strategies were used that resulted from receiving training, including:

- 1) Using multiple means of representation;
- 2) Relating key concepts to the larger objectives of the course;

- 3) Providing an outline at the beginning of each class;
- 4) Summarizing material throughout each class session;
- 5) Using instructional videos;
- 6) Highlighting key points of an instructional video; and
- 7) Using well-organized and accessible materials.

On the other hand, the control group made some changes from the pre- to post questionnaires regarding feedback, however, this change “did not significantly surpass the student rating for the intervention group” (p.204). In both groups, students reported that they were more actively engaged in learning by the end of the course.

What was missing in this study was the instructor’s voice. For example, which aspects of the training sessions were most helpful for their UDL implementation? How was the UDL framework applied? Was there any challenge in terms of UDL implementation? How do they assess their teaching practice in terms of UDL?

To examine the relationship between UDL implementation and student engagement, Smith (2012) conducted an action research study to examine one instructor’s reflective practice of implementing UDL in her graduate course over four semesters. The aims of the research explored student perceptions of faculty use of UDL in their courses, student engagement related to the infusion of these practices, and the relationship between the use of UDL and student engagement. Data were gathered from class observations, interviews with the instructors, and student surveys.

Smith provided a detailed description of the process for designing and implementing the course based on UDL. Smith’s survey consisted of 33 items related to the UDL features adopted

from Teaching Every Student in the Digital Age: Deriving UDL Solutions Template (Rose & Meyer, 2002), and 13 items related to students' interest and engagement adopted from the Utrecht Work Engagement Scale for Students (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002). The survey was distributed to students at the end of each semester; eighty students completed the survey.

Findings from the study revealed a moderately positive relationship between the use of UDL and students' interest and engagement. According to Smith, "when students perceive that the instructor is using more UDL strategies and technologies in their classes, they also report a higher level of their own interest and engagement" (p.49).

Several critiques can be made of Smith's article. Qualitative data from the students' perspective was missing. Although students were surveyed in the study, still more information is needed such as challenges and opportunities about the course design and how UDL influenced their engagement and learning in the course. Also, Smith did not provide enough details about the instructor's experience with UDL incorporation, such as the resources used, the supports in place, and the difficulties/challenges encountered in incorporating such a framework. Providing such information assists academic institutions, including leaders, instructors, and instructional designers to better understand the essential support and resources required to successfully incorporate UDL into teaching and learning approaches.

To explore students' perspectives toward UDL-inspired course attributes in-depth, Kumar and Wideman (2014) conducted a case study to examine UDL application and effectiveness in an undergraduate health science course. Kumar and Wideman provided a detailed description of how each principle of UDL was implemented in the design of this undergraduate course.

Questionnaires and interviews were used to gather data. Thirty-five students completed the questionnaire and four participated in interviews. Findings from the study concluded that most students had a positive experience with the design of the course, specifically regarding flexibility and choices in “due dates, assignments, and group or individual work” (p.135). According to one student, “I choose papers based upon the subject or idea that I find interesting and I want to learn about more. Others may not want to learn about that or they may not find it as interesting as I did” (p.135). Other students noted that having multiple formats of representation helped deepen their understanding of complex concepts; as one student reported,

The material is very heavy, but in the way [the instructor] makes it seem so easy because she gives you the lecture, she gives you the transcript of the lecture, and then we meet online, and we can discuss. It’s easy to understand. (p.137)

Also, students appreciated the amount of multiple interactions they had with each other, content, and instructor. Although Kumar and Wideman’s 2014 study was limited in terms of the sample size, their findings were positive and indicated that adoption of the UDL framework is promising for instructors. The influence of UDL on learning outcomes and student satisfaction; needs more investigation, however (Roberts, Park, Brown, & Cook, 2011).

In terms of designing online learning based on UDL, He (2014) conducted a case study on an online course she designed for teacher education based on UDL principles. Participants were candidate teachers who were teaching or interested in working with English learners. Twenty-four teacher candidates enrolled in this course; all agreed to participate in the study.

Multiple types of engagement were provided including synchronous sessions, asynchronous discussions, weekly email announcements, collaboration work, and individual

assignments. Multiple types of feedback were used including self-assessment, instructor-assessment, and peer-assessment whether they were summative or formative. Also, students had the opportunity to express their learning through multiple formats: visual, textual, and auditory.

Data were collected from multiple resources: Blackboard (LMS) statistical tracking; a pre- and post-survey that included self-assessment to examine participant's confidence in using technology in online learning and with open-ended questions related to their experience in online learning, concerns, and satisfaction; and course evaluation.

Fifty-seven percent of the participants reported that use of synchronous sessions was their favourite part of the course and being able to review the recorded sessions was appreciated. Sixty percent of the participants responded that ongoing feedback and responses to their questions through multiple formats (e.g., emails, synchronous discussion, individual and group Skype meeting) facilitated their online learning process. Some students in the final course evaluation commented on the amount of interactions and peer review, which positively influenced their sense of community. Furthermore, instructor presence was ranked as the most important component of the course.

However, several questions need to be raised here such as did the instructor design this course? How was learning facilitated during the semester? How did the instructor establish her/his presence? How did the instructor develop her/his teaching practice to use UDL principles? What were the strength and weakness areas of the design and facilitation of the online learning regards UDL? Having the instructor's voice present would enrich the study.

Positioning the Study

Although research on UDL in higher education is limited, it shows promise for

instructors to incorporate UDL into their teaching. UDL aims to assist instructors to design a flexible learning environment that responds to a variety of learning needs and preferences. Findings from previous research (e.g., Schelly et al., 2011; Davis et al., 2013) found instructors who received training sessions on UDL generally adopted its principles into their teaching practice. Consequently, having UDL principles in the design of courses may influence students learning and engagement, as they attributed flexibility and accessibility as key factors for their success (Kumar & Wideman, 2014; Smith, 2012).

It is evident, from reviewing the literature on UDL in higher education, that further examination of instructors' practice using UDL in an online learning environment is needed. Implementing UDL in teaching and learning approaches requires effective preparation for instructors and sufficient support from institutions to provide essential resources. It is important to understand the key factors that influence the implementation of UDL in higher education online courses. For example, what types of support and resources are needed to increase teaching capacity in higher education in terms of UDL integration? What lessons learned from UDL integration in higher education guide other novice implementers? How can UDL integration in higher education be fostered? Key areas such as these were investigated in this research that is reported in the following chapters.

CHAPTER THREE: RESEARCH DESIGN

Introduction

This study explored how a group of online instructors developed their teaching capacity to design and facilitate a graduate program based on UDL, and examined how their academic institution (i.e., academic leaders, teaching development providers) supported this developmental process. The following section explains the research design: methodology, case description, methods of data collection and analysis, integrity of the study, limitations and delimitations of the study, and ethical considerations.

Methodology

Case study methodology was selected for two main reasons: the nature of the complex phenomenon and the nature of the research questions. Case study methodology allows researchers to investigate a phenomenon from a holistic perspective by using multiple sources of data to gain a deep understanding, and thus provide a rich description (Merriam, 1998).

In this study, multiple stakeholders (i.e., online instructors, academic leaders, development providers) were involved to investigate the phenomenon of increasing online teaching capacity to design and facilitate online learning program based on UDL. The objective was to provide a holistic picture that:

- 1) explores how online instructors developed their teaching practice to use UDL;
- 2) describes the nature of resources provided to develop online teaching expertise;
- 3) explores the role of leadership in supporting the instructors to design and facilitate the program based on UDL; and
- 4) identifies the key factors needed to design and facilitate online learning based on UDL

principles.

In addition to the incorporation of UDL in higher education being a complex phenomenon, the nature of the research questions was suitable for case study design to be investigated. Case study design is the preferred strategy when ‘how’ or ‘why’ questions are posed (Yin, 2014). Accordingly, the study investigated how online instructors developed their teaching expertise and how their academic leaders supported such developmental processes: “The interest is in the process, rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation. Insights gleaned from case study can directly influence policy, practice, and future research” (Merriam, 1998, p.19). Therefore, the use of case study methodology enabled the researcher to deeply explore the complex process of developing online teaching practice to incorporate UDL in online teaching and learning. The results of the case study aimed to guide academic leaders and educational development providers in fostering UDL in higher education context.

Case study research is defined as “an in-depth description and analysis of a bounded system” (Merriam, 2009, p.43). Another definition is that “an empirical inquiry that investigates contemporary phenomenon (the case) in-depth and within its real-life context, especially when the boundaries between phenomenon and context are not clear” (Yin, 2014, p.16). Creswell (2007) defined a qualitative research case study as

A qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual

material, and documents and reports) and report a case description and case-based themes (p.73).

Merriam's and Creswell's definitions are similar in that both emphasized the importance of a "bounded system" for a case study. Miles and Huberman (1994) had similar perspectives on case studies, asserting that a case study is "a phenomenon of some sort occurring in a bounded context" (p.25). They presented a case graphically—as a circle with a heart in the centre—as the focus of the study. The circle "defines the edge of the case: what will not be studied" (p.25).

Given her social constructivist perspective, Merriam's strategies for conducting case study research were used mainly in the current study because of their alignment with my viewpoint and the fit for the research design. According to Merriam (2009), case study research can be characterized by three criteria:

- Particularistic: The case study focuses on a situation, event, program, or phenomenon. In this study, a specific group of online instructors who designed and facilitated a graduate program based on UDL for more than two iterations were involved in the study. Their academic leaders and development providers also participated to deeply explore the process of developing online teaching expertise through multiple stakeholders' perspectives, and thus provide a holistic picture of this phenomenon.
- Descriptive: The case study provides detailed descriptions of the phenomenon under study. The descriptive nature of the case study helped me provide a detailed description in Chapter Four concerning how online instructors developed their teaching capacity, how their academic leaders supported this developmental process,

and what types of resources were needed to be in place to foster online teaching success.

- **Heuristic:** The case study illuminates the readers' understanding of the phenomenon through discovering new meaning, confirming what is known, and/or extending the readers' experiences (Merriam, 1998). In my study, the heuristic nature of case study research aimed to help the readers understand UDL implementation in an online higher education context. As Timmons and Cairns (2010) stated, using the case study approach in education creates knowledge and understanding through the examination and exposure of practices occurring in the field: "Case study provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles" (Cohen, Manion, & Morisson, 2011, p.289).

A single-case study embedded design (Yin, 2014) was used. In this research, the single case involved a group of online instructors, educational development providers, and academic leaders who have led, designed, and delivered an online UDL-based program for more than two iterations within a Canadian university. Each level of the participants' (i.e., instructor/individual level, academic leaders/faculty level, development providers/faculty level, and institution level) was a subunit of the single-case study embedded design.

Rationale for selecting case study methodology. Several reasons guided the researcher to select a case study approach for this research. First, the nature of the phenomenon under investigation was complex, which is increasing teaching capacity to implement the UDL approach in designing and facilitating online learning. Second, data needed to be gathered from

various resources to deeply understand this phenomenon, which can be accommodated in a case study approach. Third, the case in the study was bounded in that the study aimed to explore a group of online instructors' practices to develop their teaching expertise to implement UDL effectively in an online graduate program within a Canadian university. Fourth, the study did not aim to examine participants' cultures as in an ethnographic study, develop theory as in a grounded theory study, explore the life of individuals as in a narrative study, or understand the essence of the individuals' experience as in a phenomenological study. Rather, it examined the development of online teaching expertise to use UDL effectively within a bounded case.

Case Description

The participants in this specific case study were selected from three different levels within a Canadian university: three online instructors, four academic leaders, and two educational development providers at the institution level. The case was bounded to a specific group of instructors and Academic Coordinator who designed and facilitated an online program based on UDL for more than two iterations. The online program consisted of four half-courses that were offered in a prescribed sequence within one year, starting from summer and ending in the spring semester.

The aim of the current research was to understand how, over time, the instructors developed their online teaching practices to implement UDL; the current research also explored the influence of academic leaders in the developmental process. The participation of academic leaders and development providers enabled me to capture the holistic experience and perception of supporting online teaching generally, and UDL implementation specifically. Since fostering UDL implementation in higher education is a complex process that involves support and

leadership from multiple stakeholders, the participation of stakeholders from different levels enriched the study by enabling detailed description of the support and resources provided for the development of online teaching and learning within the faculty and institution.

Since the program was not offered in the 2015–2016 academic year due to low enrolment, this study examined the instructors' reflections on their past experiences of developing their teaching capacity to use UDL in online teaching and learning approaches in the 2014-2015 academic year.

Research Questions

The study was guided by one main question and three sub-questions:

- How do instructors develop their capacity to design and facilitate online learning using UDL principles?
 - What is the role of academic institutions (e.g., leaders, instructional designers, and development providers) in supporting online instructors to effectively integrate UDL principles into their teaching and learning approach?
 - What structures and scaffolds are required to support UDL implementation in online learning?
 - What key factors need to be in place to design a flexible online learning environment that meets UDL principles?

Methods of Data Collection

The case study approach accommodates multiple data sources to enable researchers to gain a deeper understanding of the phenomenon under investigation. The aim of using multiple

data sources was two-fold: 1) to obtain a complete picture of how online instructors develop their teaching capacity to implement UDL effectively and 2) to cross-check information (Gay, Mills, & Airasian, 2009). Two main sources of data collection were used: interviews and documents.

First, semi-structured interviews were used as they produce additional questions—leading to more and deeper data—during the interviews, based on participants’ responses (Merriam, 2009). Such interviews allowed me “to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic” (Merriam, 2009, p.90). The interview questions were designed to:

- 1) Explore each instructor’s development practices in the use of UDL;
- 2) Gain an understanding of academic leaders’ and educational development providers’ roles in supporting online instructors’ development practice; and
- 3) Provide an opportunity for participants to offer suggestions and recommendations to foster UDL implementation in online higher education contexts.

Instructors were interviewed on two separate occasions. In the first interview, they were asked questions that explored how they prepared themselves to use UDL in their online teaching, what kind of resources they used, who supported their implementation of UDL, and what recommendations they would provide for other online instructors who are willing to incorporate UDL into their teaching (see Appendix A). In the second interview, instructors were asked to give me, the researcher, a guided tour of their online course shell to demonstrate how they designed and facilitated the course based on UDL.

Academic leaders were interviewed once to explore their views toward UDL incorporation into higher education teaching and learning approaches, and to understand their

roles in supporting the instructors' development practices in fostering UDL implementation (see Appendix B). Professional development providers were interviewed to explore their role in supporting online instructors in implementing UDL principles, and what resources they provided to assist online instructors (see Appendix C). All interviews spanned 40 to 60 minutes and were audio-recorded and then transcribed verbatim.

Second, documents were collected based upon the participants' consent as a source of data, including the program curriculum review conducted by some participants, course outlines designed by instructors, educational development resources offered by the participants, and conference presentations in Microsoft PowerPoint made by the participants. Screenshots of the participants' course shells were taken during the second interviews. Such documentation provided background information on the types of support that occurred throughout the participant's experience in this program, as well as evidence for outcomes.

Methods of Data Analysis

Generally, data analysis for qualitative research is a multiple-stage process that includes organizing, categorizing, synthesizing, analyzing, and writing about the data in a continual effort, cycling through stages more than once to refine and understand (Gay et al., 2009). Creswell (2007) also proposed that analytical strategies in qualitative research consists of preparing and organizing the data for analysis, reducing the data into themes through a process of coding and condensing the codes, and finally representing the data in figures, tables, or discussion.

My research employed thematic analysis, which Lapadat (2010) defined as:

A systematic approach to the analysis of qualitative data that involves identifying themes or patterns of cultural meaning; coding and classifying data, usually textual, according to

themes; and interpreting the resulting thematic structures by seeking commonalities, relationships, overarching patterns, theoretical constructs, or explanatory principles (p.926).

Thematic analysis could be used with a wide range of research interests and theoretical perspectives, as it is suitable to answer a wide range of research questions “from those about people’s experiences or understandings to those about the representation and construction of particular phenomena in particular contexts” and is appropriate for analysis of multiple types of data (Clarke & Braun 2013, p.4). The process of thematic analysis comprises three steps: identifying emerging themes, analyzing the themes, and reporting patterns (themes) within the data (Braun & Clarke, 2006).

Identifying themes occurs through coding the data, and then codes are re-arranged in groups according to similarities or relevance. Themes are identified by the number of codes that are grouped together and are given titles that represent the underlying concepts that emerge. For individual themes, a detailed analysis is conducted that identifies each theme and its relationship to the research questions (Braun & Clarke, 2006). Essentially, “A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set” (Braun & Clarke, 2006, p.28).

In this study, data analysis occurred during the stages of preparing data, coding to build initial themes, reviewing themes, and arriving at interpretations. It is important to highlight that data analysis stages were not linear but iterative. In the first stage, data from different sources were prepared and organized in readiness for analysis. Interviews were transcribed verbatim and then sent to all participants to give them an opportunity to review the transcripts for accuracy and

clarity. Collected documents were clarified and summarized using document summary forms, as explained by Miles and Huberman (1994), to explore their significance. The summary form included a description of the document, its significance or importance, and a summary of the contents.

In the second stage, each set of data was coded and then codes were grouped to build initial themes related to the research questions. Coding data and building initial themes in this stage were highly inductive.

In the third stage, each set of initial themes from different sources (i.e., interviews and documents) were reviewed and examined at two levels: 1) at the level of coded data, to ensure all data under each theme formed “a coherent pattern” (Braun & Clarke, 2006, p. 20); and 2) at the level of the themes, to identify the relationships between themes, ascertain if they reflect the meaning of the data, and if they answer the research questions (Braun & Clarke, 2006).

Microsoft Excel spreadsheets were designed to display and analyze data, which helped me as the researcher build and examine themes. Thematic maps also were used to identify relationships between codes, themes, and between different levels of themes (e.g., main themes, sub-themes). Figure 1 is a sample of one of the thematic maps created during the analysis phase.

In the fourth stage, each theme was “defined and refined” by identifying the “essence” of each theme to determine which aspect of data each theme captured (Braun & Clarke, 2006, p.22). Each theme was linked with the related research questions to start writing the case report. The defining and refining stage was deductive as I was seeking evidence to support the final set of themes (Merriam, 2009). Once written, the case report was shared with the participants in the study to provide feedback and/or to add additional information to increase accuracy.

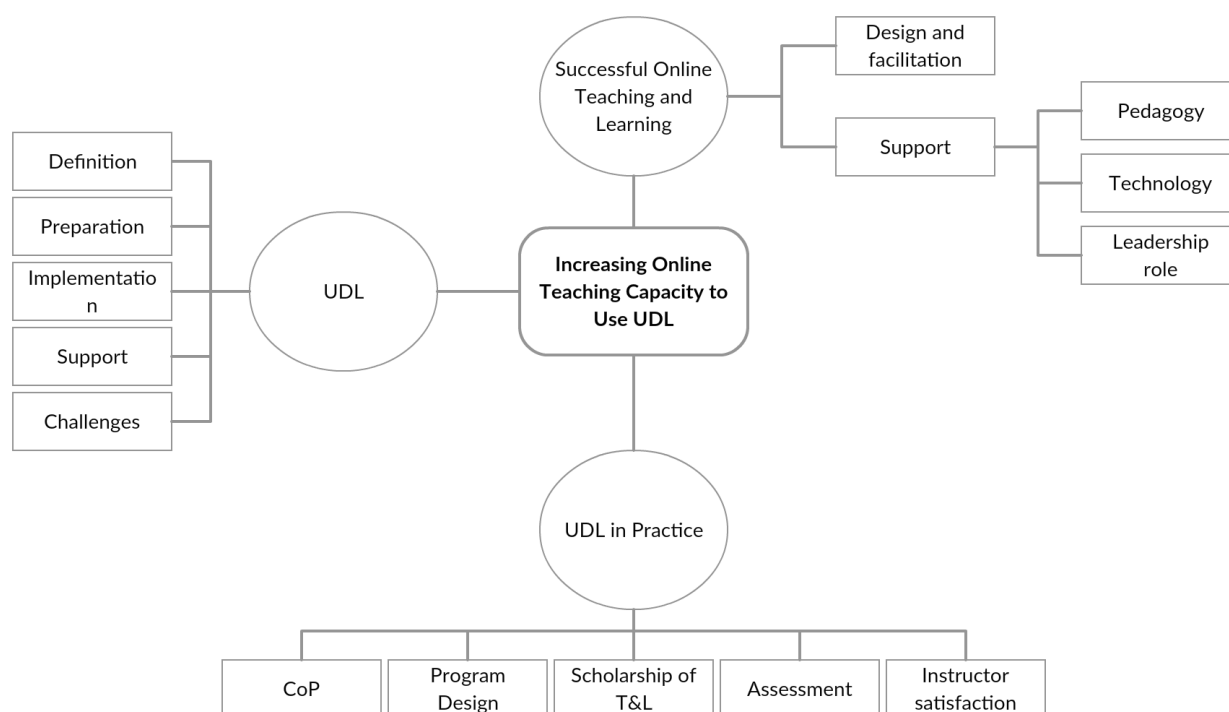


Figure 1. A sample of thematic map created for data analysis

Integrity of the Study

As with all research, producing valid, trustworthy, dependable, and credible knowledge in an ethical manner (Merriam, 1998) is imperative. Merriam (2009) stated that “validity and reliability are concerns that can be approached through careful attention to a study’s conceptualization and the way in which the data are collected, analyzed, and interpreted, and the way in which the findings are represented” (p.210). The proposed study was designed to ensure validity and reliability of the knowledge produced from the case study approach.

Internal validity or credibility. This construct refers to “the extent to which research findings are credible” (Merriam & Tisdell, 2016, p.265). Internal validity is concerned with such

questions as: Do the findings capture what has really happened? Are investigators measuring or observing what they think they are measuring (Merriam, 1998)? To ensure internal validity, three strategies, suggested by Merriam (2009), were used in this study. The first is triangulation, which involves using “multiple methods, multiple sources of data, multiple investigators, or multiple theories to confirm emerging findings” (Merriam, 2009, p.215). In this study, I collected data from interviews with instructors, academic leaders, and educational development providers, as well as document collection.

Second, a member check, which refers to involving participants in a study to check the accuracy of transcripts and interpretations, was achieved. In this study, each participant received a copy of his/her interview transcript to give them a chance to add or change any part of the transcript or even provide feedback. Six out of nine participants did provide feedback on their interview transcriptions. Three participants did not make any change to their interview transcripts as they reported their transcripts were good and there was not any need to add or change any information. Two participants did some minor copyediting such as grammar and spelling. One participants added new information and deleted others material as well; according to this participant, this interview was her first experiences and she “was a bit nervous” in answering the interview questions. Having such opportunity was appreciated by the participant and the researcher as well to increase the accuracy of the interview transcriptions. Also, the case report was sent to each participant with an invitation to read and provide feedback and/or comments within ten days to increase the accuracy of the study. Seven out of nine participants provided feedback.

Third, peer examination refers to reviewing the research findings and interpretations by other researchers, which was accomplished. As I am a graduate student, my research was peer-examined by my supervisory committee.

External validity or transferability. This construct refers to the domain in which a study's findings could be applied in other situations (Merriam, 2009). To increase the external validity of a qualitative case study, Merriam (1998) suggested providing rich and thick descriptions of the setting and participants in the case to assist readers to determine whether their situations match the context of the study and whether the findings can be transferred or not. Chapter Four provides a detailed description of the case context, including involvement of multiple stakeholders from different levels within the institution to capture the entire process of preparing and supporting online instructors to develop their teaching capacity. Based on such detailed description, readers can ascertain whether findings from this case study are transferable to their own situations or not.

Reliability or consistency. Reliability refers to the degree to which research findings can be replicated (Merriam, 2009). Yin (2009) explained that, "the goal of reliability is to minimize the errors and biases in a study" (p.45). It is important to highlight that replication in qualitative research does not guarantee the same result; it may create numerous interpretations of the same data (Merriam, 2009). This does not discredit the results of any qualitative research project, however (Merriam, 2009).

Accordingly, the key question for qualitative research reliability should be focused on "whether the results are consistent with the data collected" (Merriam, 2009, p.221). If the findings of a study are consistent with the data, the study can be considered reliable and

dependable (Merriam, 2009). To increase the current study reliability, three strategies were used as suggested by Merriam (2009):

- 1) Triangulation, by using multiple methods of data collection as explained previously;
- 2) Peer examination, by sharing all aspects of my study from collecting data to writing the case report with my supervisor; and
- 3) An audit trail, by explaining how data were collected, how themes were developed, and how decisions were made.

Boundaries of the Study

The study was designed to enable the researcher to examine the development practices of UDL incorporation into online teaching and learning approaches in higher education contexts. The case study approach allowed the researcher to examine the instructors' development practices from different viewpoints (i.e., instructors, academic leaders, educational development providers, and the researcher), which captured a holistic picture of this development. By exploring the supports and resources provided to these instructors, I identified the role of leadership in increasing online teaching capacity, the essential factors required to design online courses based on UDL, and the challenges/difficulties that higher education may encounter as they adopt the UDL approach.

Delimitation of the study. This single-case study was delimited to investigate teaching development practices to use UDL in the design and facilitation of online learning. Specifically, the study was delimited to a specific group of online instructors within a Canadian university who designed and taught a graduate online program based on UDL for more than two iterations. Academic leaders and development providers who were invited to participate in the study were

those who directly led the specific program and who have supported online instructors in the institution. The aim of the study was not to evaluate how good the program and its members were; its goal was to explore potential ways to build online teaching capacity regarding UDL implementation.

The study was delimited based on the participants' reflections on their ability to build teaching capacity to implement UDL in online teaching and learning. The study was delimited to information voluntarily shared by online instructors, academic leaders, and development providers in the institution. Data were collected from January to June 2016.

Limitations of the study. The study had three limitations. First, as a qualitative case study, it aims to gain an in-depth understanding of a phenomenon; generalizing findings beyond the case is challenging. The findings from this study reflected only those gathered from this specific group of online instructors, academic leaders, and development providers. Eysenck (1976) stated, "sometimes we simply have to keep our eyes open and look carefully at individual cases—not in the hope of proving anything, but rather in the hope of learning something" (p.9 as cited by Flyvbjerg, 2006). By providing thick descriptions of the case study readers can determine whether the findings are transferable to their own settings or not. According to Schwandt (2007), transferability is the responsibility of the readers, in which they engage in "reasonable but modest speculation about whether findings are applicable to other cases with similar circumstances" (p.127).

Second, it is important to consider the limitations of data collection methods. Interviews may provide "filtered" information, resulting from summarizing participants' views in research reports, not providing clear and articulate responses by interviewees, and/or interviewees not

sharing all information (Creswell, 2012). As well, documents can be challenging to access, and it is time consuming to determine the importance of information based on the abundance of material (Yin, 2014).

Third, my bias as the researcher is considered a limitation of case study research (Flyvbjerg, 2011) as I ultimately decide what is included or excluded from data collected and how the data are interpreted. Within the context of this study, I have had limited experience in development practices for online instructors, which may influence data collection and analysis. To overcome such an issue, I shared the case report with the participants to provide feedback; as well, the research process was peer-examined by my academic supervisor.

Successes and Challenges of the Research Design

The design of the research was successful on many fronts. Specifically, the use of case study enabled the research to deeply explore the phenomenon through the utilization of multiple sources of data (i.e., semi-structured interviews, documents). Involving people from multiple levels within the institution (i.e., the institution level, the faculty level, the program level) to participate in the study provided an opportunity to examine the complex phenomenon from multiple perspectives, and thus enriched the study. The use of member check had two benefits: 1) member check provided an opportunity for participants to add or change any information as credit for their participation in the study; and 2) member check increased the accuracy of the study.

Although the research design was well planned, a few challenges were met. Recruiting people in the study has its own challenge and consumed more time than expected. Studying the experience of the instructors in this case was somewhat challenging as they forgot some specific

details about how UDL principles were implemented in their courses. However, in the second interview they were able to recall some of details as they gave a guided tour of their course shells to demonstrate how UDL was used.

Ethical Considerations

The study met the University of Calgary's ethics review standard and received ethics clearance from the University of Calgary Conjoint Faculties Research Ethics Board (CFREB). People were informed about the study before their participation. A detailed description of the study was sent, via email, to the online instructors, academic leaders, and educational development providers to inform them about the purpose of the research, what they were being asked to do, what types of information would be collected, and what would happen to the information collected.

Also, they were informed that their participation was voluntary, and they had the right to withdraw from the study at any time. Participants signed the consent form before participating in the study and had the opportunity to review their interview transcripts. Finally, the case study report was sent to each participant to examine the interpretations and elicit comments and clarifications.

Summary

This case study aimed to explore the process of increasing online teaching capacity among a group of online instructors and the Academic Coordinator to incorporate UDL in the design and facilitation of a graduate program. Participants from different levels within the university were involved in the study. Data were collected from semi-structured interviews and

document. Thematic analysis was used to analyze collected data; findings are reported in Chapter Four and discussed in Chapter Five.

CHAPTER FOUR: FINDINGS

This chapter presents the findings from my analysis of the data collected from semi-structured interviews and documents (e.g., course outlines, course shell, PPT presentations for conferences made by the participants, the program curriculum review, etc.) as explained in the research design chapter.

The findings for this study are organized into three themes that emerged from data analysis. The first theme was online learning success, which reflects the participants' point of view toward successful online learning. Data analysis indicated that two factors influence the success of online learning involving the design and facilitation of online learning and the provision of online teaching support.

The second theme was UDL, which presented the participants' perspectives of UDL such as definition, implementation process, and challenges. Findings arising from data analysis showed that effective UDL implementation requires effective leadership to ensure sufficient preparation and ongoing support are in place to develop instructors' capacity.

The third theme was UDL in practice, which demonstrates the participants' experience with UDL integration in the design and facilitation of an online graduate program. Findings showed that a CoP facilitated the development of the instructors' capacity to successfully integrate UDL principles in their teaching approach. Each of these themes is explained in detail in the following sections.

Context of the Study

The study aimed to explore how instructors develop their teaching capacity to design and facilitate online learning based on UDL and to identify types of resources and support that need

to be in place to support such a developmental process. To investigate this phenomenon, a qualitative case study was conducted.

The case was bounded to a group of online instructors who designed and facilitated an online graduate program based on UDL along with their academic leaders and educational development providers to examine their role in the implementation process. The online program consisted of four 3-credit courses offered in a prescribed sequence within one year. The courses could be taken alone or as part of the graduate program certificate. All courses were offered online. The UDL-based program was first offered in 2013–2014 and offered twice in the 2014–2015 academic year. The Academic Coordinator (Lisa) and three online instructors (pseudonyms protect the confidentiality of participants: “Nancy,” “Heather,” and a non-participant instructor) formed the instructional design team to design the program over several iterations.

Study Participants

Participants in the study included three sessional online instructors from the UDL-based program, four academic leaders within the graduate program at the faculty level, and two educational development providers at the institution level. Semi-structured interviews were conducted with the participants and documents were collected. Pseudonyms were assigned to each participant.

Nancy is a sessional instructor who taught each of two different online courses four times including her experience in the UDL-based program. She was also a member of the instructional design team that designed and facilitated the program. Nancy had an experience of being an online student, which influenced her online teaching practice. She also participated in several training sessions for online teaching to develop her capacity. In terms of building UDL

knowledge, Nancy used CAST as the main resource. In addition, Nancy attended Harvard's graduate school, the UDL Institute while simultaneously attending a Canadian university as a doctoral student. She refined her knowledge from her mentors Dr. Rose, one of the UDL framework developers and cofounder of CAST, and Dr. Edyburn who has several publications on UDL, assistive technology and special education. Both researchers provided further discussion through phone calls and emails through Nancy's construction of knowledge and academic work for UDL.

Heather is a sessional instructor who taught an online course in the UDL-based program three times. She was a member of the instructional design team that designed and facilitated the UDL-based program. Her first experience with online learning was as a student during her Master's degree, which influenced her current online teaching practice. Heather participated in the Online Teaching Preparation Program (OTPP) offered by the university to develop her online teaching practice. Heather attended Harvard's graduate summer program, the UDL Institute, to gain UDL knowledge. Afterwards she used the CAST website and UDL Twitter chat to continue to develop her capacity.

Susan is a sessional instructor who taught a course once in the UDL-based program. It was her first online teaching experience. She had some experience in teaching in a blended format; consequently, she was familiar with the LMS. She participated in some of the training sessions for online teaching and received some support from her colleagues, the Program Academic Coordinator and the Coordinator of Distance Programs to develop her teaching capacity. Susan was not a part of the instructional design team for the UDL-based program. She

developed her teaching practice to implement UDL through working on a grant project for two years to redesign online course shells based on UDL for pre-service teachers.

Lisa is a professor and is the Academic Coordinator for the UDL-based program. She also holds a senior leadership position to increase teaching and learning capacity within the faculty. As an academic coordinator, her role is to ensure instructors have access to educational development resources to develop their teaching practice and meet their needs.

Karen is a professor and holds a senior leadership role in the faculty. Her role with regards to online learning is to ensure that technological infrastructure and support are in place to support students and faculty so that they produce quality teaching and learning.

David is an associate professor and director responsible for leading the course-based graduate program. His research interests include but are not limited to online learning, building the capacity of online educators, and educational leadership.

Julia is a coordinator responsible for distance graduate programs offered by the faculty. Her role is 50 percent administrative (i.e., managing all online courses in the faculty, including assigning instructors to the courses and helping them to set up their course shells) and 50 percent advisory (i.e., coaching online instructors to use the technology, guiding them to available resources, and helping students navigate the online learning environment).

Sarah is a director responsible for educational development at the university level. She works with colleagues across the university to increase teaching and learning capacity.

Jodi is an instructional designer in the university's teaching and learning centre. In her role, she collaborates with instructors, staff, and graduate students to implement evidence-

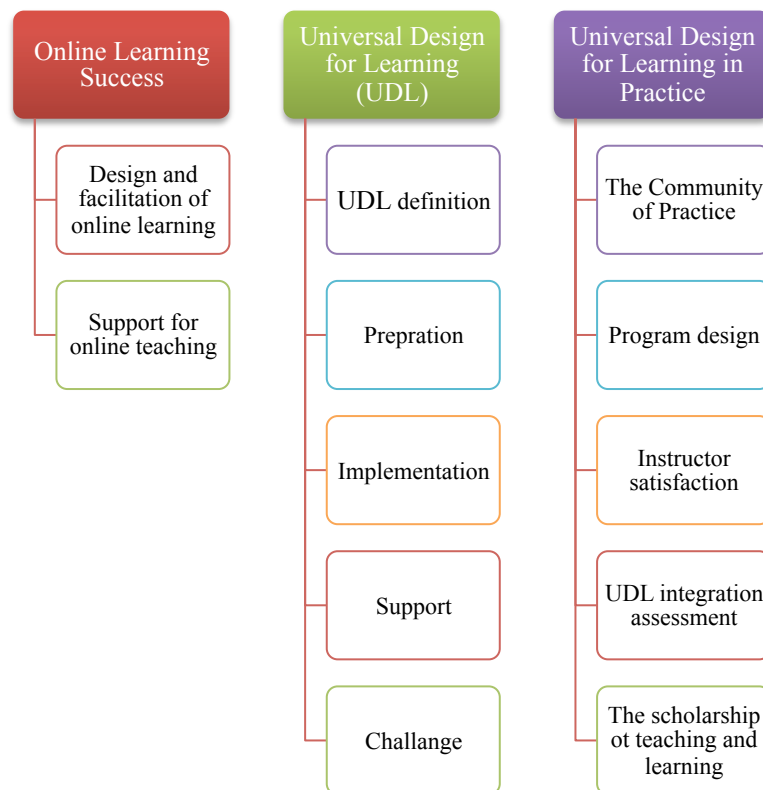
informed approaches to course design with a focus on enriching the student experience through engagement.

Analysis of the Data

By using thematic analysis as explained in the research design chapter, three main themes emerged: Online learning success, UDL, and UDL in Practice. Each of these themes is detailed described following. Each theme has several sub-themes as shown in Table 1.

Table 1.

Emerged Themes and Sub-themes



Online Learning Success

This theme represents participants' perceptions of successful online learning such as what it looks like, how it could be measured or assessed, what the factors are that influence its success,

and how online teaching could be supported. From the data analysis, two sub-themes were identified: 1) Design and facilitation of online learning; and 2) Support for online teaching.

Design and facilitation of online learning. All participants indicated that the design of online learning and facilitation is the main key that influences the success of online learning. They used such words or phrases as the following to describe the successful online learning: “engaging,” “challenging,” “inclusive,” “authentic,” “relevant,” “strong teaching presence,” and “a sense of community”.

Karen stated that successful online learning is “meaningful, engaging, and challenging” for learners. Based on the participant’s perceptions, several indicators of successful design emerged such as: 1) providing specific requirements and clear expectations, 2) having alignment of the design elements (i.e., learning tasks, assessments, reading materials, learning objectives), 3) considering online student diversity, and 4) integrating multiple types of interactions.

Three academic leaders and two instructors highlighted that successful online learning is purposefully designed and ready for students before the course begins, including daily, weekly, and monthly learning tasks. For example, Karen reported that successful online instructors have their course design developed and they “have a clear idea of the learning goals and how each task and activity and reading helps to further the learning goals.” In addition, specific requirements for each learning task and clear expectations are to be in place to support students in meeting desired outcomes: as Lisa noted, “right from the get-go, in terms of course outlines, the articulation of what the expectations are, what’s required”.

Sarah claimed that the main indicator of online learning success is the alignments of the design. She emphasized that learning objectives, outcomes, tasks, and assessments should be

aligned to foster success. According to her, “when the learning outcomes, assessments, and teaching and learning activities are properly aligned, students are better equipped to see the relationship and relevancy in what they are learning”.

Four participants (i.e., two instructors, one academic leader, and one educational development provider) reported that successful online learning is inclusive to meet the diversity of online students. For example, Nancy said, “Your class may have a student who is in their first-year teaching, a student who has never taught, and a student who has 25 years teaching.” Susan made a similar observation of online student diversity: “They’re not in a classroom, they’re not sharing experiences, the context is different for everyone, their background, their experiences were so different.” Therefore, the participants strongly recommended that student variability is considered in the design. As Karen recommended, “offer diversity in the content, the ideas, the resources so that the student can make connections with their current interests or their current occupations.” Sarah concluded that successful online learning is authentic and relevant; the course content has a sense of meaning as students are able to connect to their personal and professional contexts.

Three participants (two academic leaders and one instructor) reported that having multiple types of interactions (student-content, student-student, and student-instructor) needs to be considered in online learning design. As Julia explained, “we know the literature says that’s how adult students learn best...by learning from each other and being able to work through the material in whichever way works best for them.” Student-student interaction needs to be thoughtfully structured in “ways that build ownership for the learning and deepen the learning, rather than quick responses. It’s not the volume of what the students do. It’s the level [and] the

depth [of learning]” as demonstrated by Lisa. In addition, multiple types of communication forums (i.e., synchronous and asynchronous sessions) need to be used “thoughtfully and purposefully” in the design of online learning, as Lisa noted.

In addition to the design, online learning facilitation has its own influence on success. Based on participant perceptions, online learning facilitation involves having strong instructor presence and building a community for learners. Six participants (three instructors, two academic leaders and one instructional designer) believed that instructor presence influences online learning success. For example, Nancy, who is a sessional instructor, argued “it is really important as a professor to be online... so that people can see that you’re there...[Y]our presence is there in the forums” and you observe the students’ learning progress. Karen also had a similar perspective for having a strong instructor presence, saying “I want [students] to have a sense of my presence. I want them to know I’m listening, I’m watching, I’m reading, I’m paying attention.” For instance, she sent at least one or two group emails per week to remind students about upcoming learning tasks and activities, and acknowledged their contributions in the weekly discussion. Susan highlighted that online instructors need to have frequent interactions “as long as it’s good pedagogy; not just frequency for frequency sake. But as long as the interactions are consistent, and predictable” to build an educational relationship that facilitates the learning process.

Different strategies could be used to establish strong instructor presence as reported by Nancy and Lisa such as having a virtual office hour, responding to emails in a timely fashion, participating in weekly discussions, and providing ongoing feedback. Nancy recommended instructors present clear expectations for their online interactions to their students (e.g., office

hours, timely response to emails, participation in weekly discussions). For example, she provided information to her students about which days she checked the weekly discussion and the approximate time she responded to email. Nevertheless, online instructors need to establish a balance of their presence while not dominating student interactions, for example, in weekly discussion as Lisa reported.

Online teaching presence is not specified only for instructors; rather, students have a role to play as mentioned by Nancy, Jodi, and Lisa. According to Jodi, students share some responsibility for online teaching presence as they co-construct knowledge through exchanging resources, supporting each other, and providing peer feedback. Modeling desired expectations helps students clearly understand learning requirements and thus meet desired outcomes. For example, Lisa said “in terms of the discussion board, you should give them some exemplars, showing them, talk about what makes a good posting...also, being online, modeling that, encouraging students to be working in those ways.”

In brief, online teaching presence could be built through multiple techniques to facilitate the online learning process. Online instructors need to be aware of how to balance their presence while not dominating student interactions. To do that, students need to take a role in building teaching presence through providing peer feedback, exchanging resources and supporting each other to co-construct knowledge.

Building a community for students was considered as the second type of online learning facilitation as noted by seven participants (i.e., three instructors, three academic leaders, one learning and instructional designer). According to Sarah, when “learners feel part of a learning community...that’s really imperative to the success of an online teaching environment.” David

also had a similar opinion. He stated that having a community in online learning in which students are able to interact, support, and learn from and with each other is “an important indicator of how successful an online instructor has been.”

Lisa explained the importance of building a community for learners as it influences their sense of belonging, and thus a sense of a shared learning responsibility, so they learn from and with each other. According to her, “not all students will be at the same degree in there [a community], but I think there’s some great value, especially at the graduate level, that there is [a] shared ownership for the learning.” Nancy mentioned that in order for students to feel a part of the community, they need to feel safe and that their contribution is valued; that occurs through having an inclusive design, which means “that when you have a variety of people coming in, that the topics are open enough to lend themselves to different people.”

Findings under this theme indicated that online learning success is influenced by the design and facilitation. The design needs to be organized, inclusive, and interactive. Moreover, online learning needs to be facilitated in order to achieve desired outcomes, and that could occur by maintaining effective teaching presence and building a community for learners.

Support for online teaching. Successful online learning is supported, based on participant perception. Support needs to involve both aspects of online teaching: technology and pedagogy. According to David, Julia, and Heather, technology acquisition affects instructors’ and students’ experiences in online learning environments. As, Julia stated, if instructors and/or students do not have sufficient knowledge about how to use technology and troubleshoot issues that “becomes a huge barrier to online teaching and learning.” Heather also highlighted that we

cannot assume all online instructors “have confidence in exploring the tools and troubleshooting issues.” Therefore, offering technological support is needed to enhance online teaching.

Providing pedagogical support is important as well to foster online learning success. For example, Karen stated, online instructors need pedagogical support, such as how to promote interaction in online spaces “because they may not know the differences or the benefits and drawbacks of synchronous sessions, asynchronous discussion groups, drop-in sessions...instructors may need some support to understand those different ways of interacting with the students.” Therefore, multiple types of support for online teaching were offered whether at the faculty level, as represented by the office of teaching and learning, or at the institution level, as represented by the teaching and learning centre. The following sections describe the support provided for online teaching.

Faculty support for online teaching. Academic leaders play a key role in teaching support for online learning by providing the infrastructure required for online learning (e.g., technology) and having educational development opportunities for online teaching as Karen, Lisa, and Julia, who are academic leaders, mentioned. According to Karen, “I may not be the one that is providing those supports...but my job is to make sure that there’s a coordinated effort and that [instructors] know where to get the supports that they need.”

To support online teaching in the faculty, there was an assigned Academic Coordinator who is a full-time faculty member, for each online program. According to Karen, “[A] lot of one-on-one mentoring for teaching online happen[ed] with the Academic Coordinator and the individual instructor.” In addition, the Director of Professional Programs met several times throughout the academic year with the academic coordinators “to share best practice, to share

assessment, rubrics, to talk about issues that they [had]...[and] the ongoing curriculum review process,” as Karen explained. This structured support aimed to help online instructors and assist in supervising the progress of online teaching and learning.

In this specific case, Lisa was assigned as the Academic Coordinator of the UDL-based program. The online instructors (i.e., Nancy, Heather, and Susan) met regularly with Lisa to design the program and develop their online teaching capacity, as explained later in this chapter. From this data analysis, it was evident that academic coordinators play a critical role in online teaching success and instructor satisfaction. For example, all participating instructors spoke of the strong leadership of Lisa, as she supported them to enhance their online teaching practice, encouraged them to collaborate with each other, provided feedback, and presented with them in several conferences, which thus influenced their satisfaction and sense of belonging.

In addition, there was specialized technological support in every scheduled synchronous class to help instructors and students throughout the sessions: making sure all students were logged in and their microphones worked, as Karen explained. The online instructors (i.e., Nancy, Heather, and Susan) were satisfied with this support. For example, Nancy expressed that “Sometimes I was stressed on the night of the [synchronous] sessions, because I wanted things to flow well, and technology support people were very good about making me feel supported, and taking some of that stress away”.

Educational development opportunities for faculty members and sessional instructors were offered through the office of teaching and learning. This office was a resource for faculty support and aims to enhance teaching and learning practices whether in face-to-face, online, or blended learning environments by providing multiple types of educational development

opportunities (e.g., workshops, coaching, resources). For example, café conversation was a less formal session held several times throughout the academic year where faculty members and sessional instructors engaged in discussions and shared their practices to enhance educational development. One café conversation topic was how do you get greater interaction and engagement in the online environment? As reported by Lisa, the aim of these conversations was to share, “from the research some of the things we know that do work, and getting people thinking: I could try that.”

Weekly formal session, an hour in length, were also held to discuss different topics related to teaching and learning in post-secondary education. Monthly newsletters were sent to the faculty member, staff, sessional instructor, and graduate students, to highlight upcoming educational development opportunities. Online instructors Nancy, Heather, and Susan, mentioned that they attended several educational development opportunities regarding online teaching, however, they did not remember which ones. For example, Susan reported “there were lots of opportunities for me, over the years...Not necessarily just before this course, but over the years, to take part in workshops, or receive one-on-one support.”

Technology coaching was a customized support to assist instructors in navigating the new LMS and thus design their course shells. According to Lisa, “Our coaches meet one-on-one. One of the things I really like about our coaches is when people make appointments, they have to identify what they want to work on.” Susan was one of the people who utilized the provided technology coaching to explore the affordances of the LMS and design her course shells. On the other hand, Nancy and Heather did not attend the technology coaching sessions because they were familiar with the LMS.

Lisa and Julia argued that although a variety of educational development opportunities were offered, the challenge became for people to decide which opportunity they need and whether they are willing to invest their time to develop their teaching practice. According to Lisa, “you can offer a variety of things, but will people engage in them? Sometimes people don’t engage until they’re in trouble.”

Institutional support for online teaching. The university’s teaching and learning centre represented the institutional support to increase teaching and learning capacity for faculties across the institution by building networks of practice, supporting technology integration, and promoting evidence-based approaches as reported on their website. Based on collected data (i.e., interviews with Sarah and Jodi and documents), several opportunities were offered to support online teaching:

- OTTP (i.e., for novice online instructors to support them to successfully navigate online teaching);
- Instructional Design Program (i.e., helps instructors to design or redesign their courses by developing measurable learning outcomes, planning learning activities, and creating assessments);
- Online Teaching Award (i.e., recognizes teaching excellence by full-time academic staff who developed and taught two or more online or blended courses); and
- Teaching and Learning Grant (i.e., in support of evidence-based projects that integrate research evidence into teaching and learning practice, generate new knowledge about teaching and learning in the institution, and disseminate the findings of the projects to benefit others in the institution).

Since the participants in this study, specifically Heather, participated only in the OTPP, that program is described in the following section.

The OTPP was offered to instructors and graduate students who teach or are willing to teach online. According to Sarah and Jodi, OTPP was a four-week program offered once per semester and delivered completely online. People explored one module per week with the intention of learning practical skills and knowledge in both developing and teaching an online course as Jodi explained. The four modules were: 1) exploring online learning, 2) online teaching and learning activities, 3) online student assessment, and 4) planning your course (as reported in the program description). Jodi said that “participants [were] expected to complete a set of criteria, which include[d] participating in all online activities and assignments, as well as engaging in quality discussions with participants and facilitators.” In addition to the pedagogical aspect of online teaching, participants had the opportunity to explore technological tools. Heather was one of the participants in the OTPP; she said, “I signed up to do the Online Teaching Preparation Program...it was phenomenal. It was free to me; I could fit it into my life...So that was a very good support for me in designing the course.”

From the data analysis, it was evident that online teaching was supported whether at the faculty level or the institution level. Online teaching support occurred by offering multiple types of educational development opportunities ranging from informal sessions to a formal program, from short one-hour sessions to a long four-week program, from group support to one-on-one coaching. Then, it became instructors’ responsibility to decide which types of support they need to improve their online teaching skills.

Summary. Based on the findings, instructors, academic leaders, and development providers believed that successful online learning depends on two main factors: 1) The design and facilitation; and 2) Support for online teaching. The participants acknowledged that online learning needs to be designed thoughtfully to assist student interaction with content, instructors, and peers to acquire and construct knowledge. Establishing online instructor presence occurred through public and private interactions with students to guide their learning progress and acknowledge their contributions. Building a community in online environment facilitates student interaction to support each other and build collective knowledge. Instructors need to be prepared and supported technologically and pedagogically for online teaching.

Universal Design for Learning

This theme focused on participant's perceptions and understandings of the notion of UDL and the types of support and resources needed to foster UDL integration in higher education. The following questions were asked during the interviews: What is your definition of UDL? What are some benefits of UDL integration in higher education? What structures and scaffolds are required to foster UDL integration? What are the main challenges that higher education institutions may encounter in UDL implementation?

Based on the analysis of the interviews, five sub-themes were identified: definition, preparation, implementation, support, and challenge.

UDL definition. Participants' definitions and understandings of UDL focused on designing a learning experience that meets variable learner and learning needs. They acknowledged learner variability and understood how UDL could be used to design an inclusive

learning environment that meets the needs of all learners through having multiple opportunities to engage in learning, represent information, and express knowledge.

It was evident that all participants (e.g., academic leaders, educational development providers, and online instructors) shared a common understanding of UDL principles. The participants used the following words and phrases to define UDL: “multiple opportunities,” “meet the needs,” “design for diversity,” “multiple pathways for learning,” and “inclusive.” For example, Lisa defined UDL as “designing the learning experience and environment for all learners in the sense of giving them the tools and opportunities to learn and represent their knowledge well.”

Karen provided a detailed description: “Universal Design means within individual learning tasks, with assessment criteria, with the way that we put materials together, we have to give people multiple opportunities to express their understanding, to engage with the materials, to represent their learning.” Nancy offered a similar description, stating that UDL is about “designing courses or...any kind of learning environment [based on] the three principles as much as possible: multiple means of representation, multiple means of demonstration, and multiple means of engagement. For me, it’s about designing to the edges to meet the needs of myriad learners.”

Julia described UDL as “providing all of our learners with the right tools to learn...It’s looking at different learners and how they might approach a subject matter, and how they would view something, and how we can facilitate their learning.” Similarly, David defined UDL as “trying to create multiple entry points for any learner to learn. It’s designing ways for learning to unfold in a way where people at varying skill ability levels can engage and move forward.”

Sarah had a unique perception of UDL, as she believed UDL is related to social obligation: “I think we have a social obligation to help provide inclusive learning environments that benefit the learning of every student.” Jodi emphasized that UDL requires a shift from the traditional “one-size fits all” system to more inclusive system; as she explained, UDL “is providing multiple pathways for learning, so it’s inclusive. It really sets the learner up for success...So you’re trying to really reach the potential of the student...[by] breaking a very traditional system.”

Heather admitted that UDL influenced her worldview: “UDL is a framework that helps you intentionally design for diversity from the beginning, so that you’re being proactive...UDL, to me, is not just a framework to do...It’s almost a lens or a way that you can view the world.”

According to seven participants, implementing UDL in higher education may enhance student success and increases their satisfaction. Karen explained that UDL “raises the quality of a program, it increases the chance that students are going to be successful and they’re going to be satisfied...I see that it’s a no-risk strategy for improving the quality of instruction.” Jodi mentioned that UDL, “has the potential to empower learners in the way they show their learning and construct their learning...I think that’s a huge benefit to UDL.” Moreover, UDL could increase the quality of student learning through having an opportunity for diversity. As Heather explained, UDL influence the quality of learning: “many more people can be successful at university...because of the diversity in your classroom, the richness of the discussion and the academic debate, and the difference of perspectives.”

On the other hand, Sarah went beyond student success and satisfaction; she claimed that UDL may influence instructor confidence and self-efficacy by promoting a successful teaching

experience. According to her, “UDL can help to improve an instructor’s success, and self-efficacy as well. It helps to create successful learning environments. Also, it helps them as a teacher...in their own sense of efficacy and confidence.”

The participants shared a common understanding of the principles of UDL and its application to design a flexible inclusive learning environment to meet diverse learning needs. Additionally, the participants identified some benefits of UDL integration in higher education as UDL holds the potential to increase the quality of teaching and learning by acknowledging learner diversity, thus increasing success for all and influencing instructor and student satisfaction.

Preparation. Successful UDL implementation requires sufficient preparation for academics (e.g., instructors, leaders, support staff). From the analysis of the interview data, the following emerged in terms of how instructors and educational institutions need to work to be better prepared for UDL integration in higher education: 1) Hosting open educational conversations; 2) Building a network of colleagues; and 3) Creating a clear vision and strategic plan. Each of these items is discussed in the following paragraphs.

First, hosting open educational conversations with instructors related to student variability and how UDL helps in design of an inclusive learning environment to address all learner needs is a necessary step, as explained by five participants (two instructors, three academic leaders). These conversations aim to increase the awareness of UDL and resolve misconceptions. For example, Julia argued “the biggest challenge is instructor knowledge... providing them with those learning opportunities” to become familiar with UDL and learner variability is a critical step in preparation.

Lisa and Nancy explained that misconceptions regarding UDL occur in the field, for example, that UDL is specifically for special education or that UDL is about using technology in a classroom, which creates the need for a preparation phase.

Susan explained the mechanism of hosting professional dialogue as “you are able to gauge receptiveness. You want to gauge their attitude toward this kind of format [UDL].” Then, academics who are open to trying new teaching and learning approaches “are going to be able to receive the information and then engage. They’re going to want to try to learn, and they’ll want to become proficient.”

Conversely, there are some academic, who are more resistant to changing their traditional approach, so more work needs to be done to shift their perspective: “showing them...what the positive outcomes are for the students...demonstrating what the rewards are for them as an instructor.” Hence, those educational conversations need to be supported with evidence as Sarah noted. As most higher education institutions are research-intensive, “we need to be able to communicate appropriate research-informed evidence that [UDL] actually makes a difference ... in order to get appropriate buy-in.” Susan concluded that having buy-in from instructors facilitates UDL implementation “much more smoothly,” and that happens through conversations; instead of telling instructors, “you need to do this by this deadline, sometimes that’s the shift of last resort.”

Second, building networks of colleagues was recommended by Lisa, Sarah, and Heather for the UDL preparation phase. The aim of networks is to provide an opportunity for instructors to support each other’s practice and learn from and with each other. Lisa mentioned that networks allow instructors to “have a go-to person to go to, to be able to say: How did you set

your course up? How did you wrestle with the issue when somebody asked a question about fairness or equity? How did you assess these?”

According to Heather, UDL implementation requires more than providing workshops; it requires “working at the elbow with [instructors]... There has to be a mechanism where you can connect with people who are trying to move forward in this work, build trust among each other so that you can actually ask the tough questions and be honest.” Sarah supported her argument with evidence from the research literature:

There’s some really interesting research coming out of Lund University that says people actually develop as university instructors through small but significant conversations with a few trusted colleagues. So, if we here provide opportunities for those small but significant conversations to occur, and for knowledge to transfer between those small networks, then change will occur.

Third, three academic leaders reported that creating a clear vision and strategic plan helps instructors prepare for UDL integration. According to Karen, “we have to have the vision for UDL. If that’s an expectation across programs... then everything we do has to line up with that vision. Strategic planning for implementation follows the vision.” Based on the vision and strategic plan, individual instructors are more likely to design or redesign their courses based on UDL. David argued that “change is hard. It’s not that easy to do. I think the culture... is changing quite significantly because of clear vision.” According to Karen, if UDL is “not a part of the strategic plan, it’s got chance of success in little pockets here and there. But if it is a part of the strategic plan, there is a much greater chance at success.”

Successful UDL implementation starts with proper preparation for academics. Three methods were recommended by participants to use in preparation phase:

- 1) Hosting educational dialogue to increase academics' awareness of UDL and learner variability;
- 2) Building networks of colleagues who are implementing UDL to share their practices, support each other, and learn with and from each other; and
- 3) Creating clear vision and strategic plan to motivate instructors to design their courses based on UDL.

Implementation. Three participants mentioned that UDL implementation requires effective communication and collaboration between and among multiple levels (i.e., institution level, faculty level, and program level). Based on the participant perspective, UDL implementation starts at institutional level through creating a clear vision and policy, offering resources, and rewarding scholars. For example, David argued that the role of the institution in supporting UDL implementation is “re-conceptualizing and creating a vision for people to work toward, and then strategizing to support that.”

Sarah had a similar perspective: the institution level, or as she called it the “macro level,” fosters UDL implementation by creating and providing policies (e.g., vision, strategic plans, recognition, and reward system), resources, and processes put in place to enable people to adopt UDL. Then, at the faculty level, sufficient and customized support needs to be offered. According to Sarah, at the faculty, departmental, working group, or “meso level,” local leadership and networks help create strong microcultures that support individuals and groups of instructors in UDL implementation: “I truly believe that is the most important level...where

action and change is actually implemented.” After that it happens at the individual level, or “micro level” as Sarah named it, in which instructors are responsible for investing their time to develop their teaching practice and redesign their course based on UDL. According to Karen, “individual instructors will do that if that’s a part of the vision and part of what gets rewarded.”

Sarah also noted that “In most cases, I think people won’t make a change unless they’re supported, rewarded, and recognized for making that change.” Therefore, scholars and implementers need to be recognized and rewarded and provided with channels to reflect on and share their practices. Sarah concluded that “no one individual is going to be able to change the whole practices of an institution,” thus, implementation should occur across multiple levels.

In summary, successful UDL integration in higher education is more than individual initiative; it requires academics from institution level and faculty level to communicate effectively to support individual adoption of UDL. Creating policies and strategic plans followed by providing resources and customized support is the first stage of effective UDL implementation. Moreover, having recognition and award systems may encourage individuals to adopt a new teaching approach.

In addition, UDL implementation is an iterative process as reported by Sarah, Nancy, and Heather. For instance, Nancy said “Even when I come from a background of deep understanding of UDL, each time I have taught the course I have expanded pieces to make sure that it gets designed further to the edges.” Therefore, sufficient time needs to be given for instructors to redesign their courses gradually over time and expand their teaching capacity as well. Consequently, Sarah recommended instructors teach the same course more than once to better design and redesign the course based on UDL over time. According to Sarah and Nancy, one of

the challenges of UDL implementation is the mistaken belief that instructors need to redesign their courses to be based completely on UDL all at once.

Support. Supporting UDL implementation occurs through strong leadership, ongoing formative feedback, and faculty development as identified by seven participants. Strong leadership is reflected on supporting instructors to develop their teaching capacity by creating educational development opportunities. For example, Lisa reported that leaders “have a role to play in creating opportunities for instructors to come together to learn about UDL...ensuring that whoever provides them with technical and pedagogical support has an understanding of UDL... looking at their design, and giving them feedback.” Susan explained the importance of leadership role in supporting UDL as “academics always want to know: Why is this best or not? Why are we’re doing it.” Julia concurred that having the support of administrators “is really important because if you had an academic leader who may not necessarily be an advocate for [UDL], you’re not going to get anywhere...because faculty will say my Department Head doesn’t really care, so why should I care?”

Providing ongoing feedback throughout UDL implementation from designing a learning environment and facilitating the learning process to assessing learning outcomes was recommended by Susan, Heather, and Nancy. For instance, Nancy stated instructors should not feel isolated during UDL implementation; rather, they should be able to ask their academic leaders for advice and get feedback on their UDL integration. Susan also highlighted that importance of ongoing formative feedback, specifically at the end of the course or UDL implementation, stating “a check-in toward the end might be a useful way for administration to track how” UDL was implemented, because “we can all say at the beginning oh yes, I’m going

to do this, and this, but a check-in toward the end might be helpful, and pull the person's attention back" to assess the UDL implementation process. Formative feedback would be provided also by colleagues as well, as noted by the study participants.

Seven participants also noted that faculty development needs to be in place to support instructors to better understand UDL principles and its theory. Pedagogical and technological supports are needed to foster UDL integration. These supports need to be flexible and customized to meet the needs of instructors. For example, Karen reported that "we need to have strong faculty development, we have to have opportunities for faculty to learn these principles, to adopt some of the practices."

In terms of technological support, Heather said "we can't assume that even though instructors are passionate about UDL and they want to try and use that in their course... they can figure out how to leverage all of the affordances within the LMS." Julia argued that development opportunities need to be flexible and low risk: "Maybe provide [instructors] with some tailored training and that kind of thing so that they can fit it into their schedules and that they can devote time to it." Moreover, access to funding and appropriate expertise was recommended by Sarah and Heather as another type of faculty development support.

Challenge. The participants identified four challenges that may affect UDL integration in higher education. First, lack of knowledge was reported by three participants (Julia, Nancy, and Lisa) as the main challenge facing UDL integration. For example, Julia argued, "I think the biggest [challenge] is knowledge, and people having a clear definition of what it means and how they can support their learners. Nancy also explained that instructors need to understand UDL principles and how to implement them while keeping their "course rigour." She said, "people

need to get over that it has to be one-size-fits-all, otherwise how would it be fair?” Lisa also agreed that a lot of misconceptions occur in the field, which illustrates the need to increase the awareness of UDL in higher education.

Second, changing the mindset and tradition around teaching and learning approaches is challenging in higher education, as UDL requires a flexible and inclusive design in which learners are empowered to select tools and approaches that best fit their own learning preferences instead of a “one-size-fits-all” approach as mentioned by two participants, Karen and David. For example, Karen spoke of the tradition of teaching and learning in higher education system as “one-size-fits-all.” According to her, a lot of academics “are teaching in other disciplines have had no training whatsoever on how to be a good teacher, or have had no training on how people learn best.” Changing mindsets around learner variability and learning preferences is needed, however, “mindsets aren’t changed if people are not required to change their mindset” (David).

Third, lack of time to increase teaching capacity and redesign courses is another reported challenge by David, Nancy, Julia, and Sarah. David noted, “People are very busy. To a certain degree, they’re on an academic treadmill, they have to publish or perish, they have classes to teach, they have their own interests, and they have meetings that they have to go to,” which may create a challenge for them to find time to learn and practice new teaching approaches such as UDL. Therefore, Nancy and Julia highlighted that sufficient time needs to be given for people to first acquire knowledge of, and then gradually implement UDL. According to Nancy, “If the university is believing that Universal Design is part of their belief system, then people need to come on board, even if it is gradually, and they’re given the time and opportunity to have professional dialogue or professional development.”

Fourth, Sarah observed that insufficient empirical research on the effectiveness of UDL incorporation in higher education context is a factor that is often overlooked. Having empirical research on UDL implementation and outcomes on student learning, engagement, and satisfaction would help motivate instructors to adopt this approach and redesign their courses; otherwise, it may be challenging, as most higher education institutions are research intense.

Summary. Based on the findings, UDL implementation is a complex process that requires meaningful collaboration between and among multiple levels. Preparation is essential for successful UDL integration, which includes creating a clear vision and strategic plans along with offering appropriate resources and support. Effective leadership creates enabling conditions and opportunities for instructors to share their experiences, exchange resources, and provide formative feedback to learn with and from each other. Consequently, sufficient time needs to be given to increase teaching capacity and incorporate UDL gradually.

Universal Design for Learning in Practice

This theme demonstrates the process of putting UDL theory into practice. Specifically, it describes the participants' (i.e., Lisa, Nancy, Heather, Susan) experiences in designing and teaching the UDL-based online program. Five sub-themes were identified in the data analysis:

- 1) The Community of Practice;
- 2) The program design;
- 3) Instructor satisfaction;
- 4) UDL integration assessment; and
- 5) Scholarship of teaching and learning.

The Community of Practice. Three participants, Lisa, Nancy, and Heather, identified the main factor contributing to the program's success was building a CoP. They used such phrases to express their feelings toward having such community: "we do have a sense of community," "I did not feel isolated," "we could become a little community of practice," "it was a really incredible experience," and "we really supported each other in designing our courses." According to Lisa, the use of a community approach in designing and teaching the program resulted in "continuity, consistency in terms of the nature of the program, [and] in the way the program [was] taught."

To build a CoP, the Academic Coordinator and the instructors, who formed the instructional design team, agreed to collaborate and support each other in the development of the program design and facilitation at the early stages of the program as reported in the Program Curriculum Review. They met prior to teaching the program to discuss program goals and design, and how to model UDL in online learning as explained by Nancy and Heather.

During the design phase, the team shared their course design, exchanged resources, and provided formative feedback. As Heather mentioned, "we were bringing forward our draft syllabus, and sharing them with each other for feedback, or looking at resources—the conversation was always around: Are we really modeling, are we leveraging the UDL framework in our work." Nancy offered a similar description:

We had this deep trust in what we were doing...we developed some of the things we were doing, and passed them back and forth, and we received feedback, and it was feedback in a very collaborative sense...I think that when you're open to critical friends, it grows you as an educator.

In addition, after each course ended in the four-course graduate program, the instructors and Academic Coordinator met to reflect on what worked, what did not, and what changes could be made in the future. As a result, the instructor had an opportunity to learn with and from each other's experience as well as learning about their students. As Heather reported, "I felt that I had a much better understanding of the learners that I was coming in to support." The data indicated that it was evident that the CoP assisted instructors to increase their teaching capacity and foster UDL integration. Regular meetings, commitments, collaboration, trust, and common interests were the key characteristics of the CoP.

This approach requires effective leadership to create enabling conditions that build and maintain a sense of CoP, as explained by the instructors. For example, Heather reported, "[Lisa] encouraged us to come together as a community of online instructors, supporting each other. She really created those enabling conditions where she helped us get to know each other, and build trust, and do meaningful work together."

Nancy had a similar opinion: "[Lisa] is very enthusiastic and supportive, and created opportunities for us to come together, and sort of insisted on it, which was really great because you could talk about the challenges and the successes of the course" to inform the next iteration. As a result, the instructors had the opportunity to learn with and from each other "in terms of content, technological and pedagogical issue that emerged as part of teaching in this program" (The Program Curriculum Review).

However, newcomers to an established community may need sufficient time to have a sense of belonging. For example, Susan was only hired to teach the course once and was not part of the instructional design team, as a result she did not feel that sense of community, "I can say I

didn't feel connected to other instructors doing the same thing.” Therefore, attention may need to be given for newcomers to a community to have a sense of belonging and thus build a collective knowledge.

Program design. The program design and facilitation were influenced by social constructivism learning theory and the UDL framework as Nancy noted. According to her, the use of social constructivism along with the UDL framework influenced the level of learner engagement: “I think it enriches the program and it gets people really engaged in the learning, and being a part of growing and constructing the learning.”

From the data analysis, what emerged from the program design in term of supporting UDL integration involves four features. First, “The intentional design of the program requires that each course builds on the knowledge and skills from the previous course” (The Program Curriculum Review). Lisa explained that the design team wanted the courses to “build off each other.” For example, one assignment, “Toolkit,” was required in all the courses. During each course, students developed their toolkit so as to be able to design an action plan based on their collective knowledge in the fourth course. The collaborative constructive design enabled the instructors to better know what was previously taught and how to build upon that knowledge base.

Second, the use of reflective meetings throughout the program enabled instructors to assess their UDL integration. According to Heather, “the conversation was always around: are we leveraging the UDL framework in our work, and modeling this to our students?”

Third, the program design involved an iterative process. According to Heather, the program used UDL successfully because of this approach: “We just kept tweaking and improving, so by the last course, I think I could say, Yeah, the program worked.”

Fourth, UDL implementation was embedded in the design of the program and the facilitation of online learning. According to Lisa, “the program is doing extremely well in modeling and representing the elements of UDL.”

During the second interview with the three instructors, they were asked to give a guided tour of their course shells to demonstrate how UDL principles were implemented. In the following sections, a brief description of each instructor’s course design is provided to present their online teaching approach and show evidence of the intentionality of UDL integration. Since Susan did not design the course she taught, and only taught it once, her course description is excluded.

Nancy’s course. To successfully incorporate UDL in online learning, Nancy considered three elements in design and facilitation. First, she believed that online students varied in their learning needs and background, thus it was important to provide “choice, and safety in that choice.” What she meant by safety in choices is that formative feedback need to be provided by the instructor to give students some affirmation and guidance for their choices, thus “allow[ing] them to not have fear about [issues such as] I could be heading off in entirely the wrong direction.”

Second, having a sense of community and peer support in online learning enabled students to engage in learning within the UDL approach. Nancy emphasized this to her students:

“[I]n this course, it is important to recognize that people will be coming from different perspectives and different journeys,” therefore every contribution is valuable.

Third, identifying learning barriers in the curriculum or learning environment was a part of her UDL integration. According to Nancy, “the problem here is not the student, the problem here is the curriculum. If we can open up this curriculum for this student, then the student can perform, and show us the knowledge.” For example, in an online graduate course “the barrier could be time stresses that [students] have in their life where they’re taking courses, but they also have these other things that are out there, so being a little bit more amenable to due dates” was a strategy that Nancy used. “I did have deadlines, but they were approximations...Most people try to go with the deadline...but the few people who needed that extension weren’t stressed so much because they knew that they had that little bit of flexibility.”

In terms of UDL principles, Nancy provided numerous means of engagement and representation for students in the weekly modules through multiple reading materials and multimedia resources such as videos, Microsoft Power Point slides, and images. It was a challenge to find alternative formats to support reading materials and course content as Nancy found. Therefore, she encouraged her students to search for multimedia resources that aligned with the weekly modules and share them with others to enrich the learning experience for everyone in the class.

It is important to note that one of the weekly discussions did not include an alternative format other than peer-reviewed research papers. Nancy responded to that saying, “I actually didn’t give a choice there, because it’s not always with UDL [providing] choice about every single thing. The goal here was to really look at the peer-reviewed research.” Students had a

choice to select a research paper that was relevant to their interests, however. In addition, Nancy provided some guided questions for weekly discussion and students could select from or even create their own questions to reflect on, based on their own interests.

In terms of knowledge demonstration, students could reflect in weekly discussions through different formats, such as written format, poster presentation, Microsoft PowerPoint, Prezi, or videos. Nancy encouraged students to demonstrate their knowledge through different formats. In one weekly discussion she stated, “Consider at illustrating your knowledge-building through an alternative way that stretches you and may make you feel uncomfortable.” Some students used multiple formats to express their reflections. According to Nancy, students “have to feel satisfied and engaged in the course, or they’re not going to grow and learn.”

For the final assignment, one of the graduate course expectations was to write a research paper, but Nancy asked her administrator to change that requirement, stating “I can’t do that because I need to model to students that there are multiple ways of demonstrating knowledge and to only have a research paper actually goes against the whole principles of UDL and that theoretical perspective.” Fortunately, Nancy was supported to provide options for the final project, “the university was supportive of me changing that particular piece, even though it was pretty standard practice in a graduate course, apparently.” The final project was worth 35 percent of the course weight.

Students could select writing a research paper (10–12 pages) or an equivalent alternative format, such as a substantial video that presented their research topic. Students were required to discuss with Nancy their format choice for the final project and get approval. Nancy provided clear expectations for the final assignment during one of the synchronous sessions.

To facilitate the final project, students were asked to submit an annotated bibliography for eight to ten articles from academic journals or chapters from books relevant to the course content to be used in the final project along with their research questions. Feedback and guidance were provided to help students prepare for the final project. According to Nancy, 40 percent of the students used a format other than writing a traditional research paper. “It was really very interesting for me to assess these alternative projects...It was really affirming to see students demonstrating their knowledge and applying it to something that was going to be real,” Nancy observed.

Understanding learner variability, identifying learning barriers, providing formative feedback, and building a community for online learner were the main techniques used by Nancy to incorporate UDL into online teaching and learning approaches. Students had a role to play in supporting each other by exchanging resources to enrich their learning experiences and providing peer feedback. Online students needed to be encouraged to try new approaches such as demonstrating their knowledge through multiple formats. However, not all students responded to this approach to the same degree.

Heather’s course. To successfully incorporate UDL into online teaching and learning approaches, Heather considered four elements. First, she went beyond the three-principles level of UDL to apply the guidelines under each principle as much as possible for successful integration.

Second, she identified learning barriers in her design so as to remove and/or reduce them: “What unintentional barriers did I design in there?...That can be a hard conversation to have with

yourself as an academic. You put a lot of work into designing a course; you think it's awesome," she said.

Third, the CoI model by Garrison, Anderson, and Archer (2000) influenced Heather's design and course facilitation in terms of teaching and social presence. To establish her presence, weekly videos were created to acknowledge student participation in the weekly discussion, summarize key points, and clarify any misconceptions. According to Heather,

This is the room I recorded everything in...so they knew that this is the office I'm working in. Sometimes my daughter would knock on the door while I was in the middle of something, and I didn't edit anything out. I wanted them to kind of interact with me as a human.

Heather also used videos for providing feedback for individual students. She felt more authentic in her feedback through having "a smile" on her face. As she said, "I wasn't worried of coming across as too critical or too harsh or too stern, because they could see my physical expression."

Fourth, Heather did a survey at the beginning of the course to determine student background and interests, and then modified the course design (e.g., reading materials, weekly discussion, etc.). The first three modules were ready and posted in the course shells at the beginning of the course, however, the rest of the modules were not posted in case any modifications needed to be done to meet student interests. Based on the survey, some reading materials were added as alternative multimedia resources.

In terms of UDL principles, Heather provided multiple types of engagement and representation. Each weekly module started with an introduction to the assigned topic "in case

[students] had no background area.” Then in the weekly discussion some questions were provided to guide student thinking while they read the assigned articles, watched multimedia resources, and reflected on. For example, questions posed included: “What are the big ideas? What did you like about these readings and videos? What surprised, intrigued, or disturbed you?”

Heather’s approach supported students to be “focused in their reading, and more metacognitive...scaffold them while they were reading.” In addition, some videos were provided so students could select one or two of them to watch. According to Heather, “most students chose to watch all of them, actually, even though they didn’t have to watch all of them...that shows a higher level of engagement; they were curious and interested.”

Heather provided optional reading materials and stated in the module, “If you feel like the required readings didn’t really add anything to your body of knowledge you already have in this module, challenge yourself to the optional readings.” At the end of the weekly module, students were required to reflect on the weekly discussion.

Heather created a course hashtag and tweeted regularly during the course. She often retweeted key people in the field and shared research related to the weekly modules so her students could create their own personal learning networks. Although a few students tweeted using the course hashtag, it was evident in the weekly discussion that more students were reading the instructor’s tweets (The Program Curriculum Review).

In terms of action and expression, most of the students used text-based format. Heather reflected on that, saying “I try to model and give them choice in how they showed me what they know in some of the assignments where it was appropriate, but most of them stuck with print-

based.” Only a few students used video or audio format to communicate individually with Heather.

The final assignment was a written research paper as one of Heather’s course goals. It is important to highlight that the structure of the assignment scaffolded student progress, starting from choosing a research interest to selecting peer-reviewed papers. At the beginning of the course, Heather asked her students to read the weekly modules and then reflect on what they felt they already knew, and what they wanted to learn more about in the modules. The reflective task had two objectives: 1) help students identify a research area for the final assignment, and 2) help the instructor to modify weekly modules to best meet student interests and needs. Based on their reflections, students identified a research topic related to course content, identified research questions, and then submitted an annotated bibliography for eight to ten peer-reviewed articles or book chapters to be used in the paper. Feedback and guidance were provided throughout the writing process.

For the course shells design, Heather considered several items such as accessibility and redundancy. To have accessible learning materials, every module had a PDF copy, so students could download it to work offline:

Some of the people have families; they would print this [PDF] off, then they’re at their child’s soccer game or whatever, and they didn’t have to worry about having Internet connection...they have everything that they need to keep them on track, and make double duty of their time.

In addition, she hyperlinked in every module to the reading materials, discussion threads, and rubrics. This technique enabled students to navigate content quickly and easy; thus, they

were more focused on the learning process rather being distracted trying to find materials. As Heather said, “having the hyperlink there, it just removes that barrier for students so that they can get to where they need to be quickly, and not be fighting with the technology.”

Heather used some of the LMS features to scaffold students’ learning such as calendar, student progress, and Dropbox. The calendar that was built into the LMS was used to set up the due dates of each modules, learning tasks, and upcoming events to assist students manage their time. Heather explained,

For every module, I clearly put on the side the dates of the module. Also, I put due dates in the calendar. I put a lot of redundancy into the course, which I think is a part of good online design, thinking of UDL. So some people seeing it in a calendar view is better, some people never go into the calendar and like to see the list, and making sure the date is clearly there for them. Learning reminders also were sent for upcoming due dated. Like when their initial posting is due and when they needed to reply.

Heather also used the class progress tool in LMS to track each student’s learning progress and thus provide accurate weekly feedback. For example, she may send a message to a student such as: “I can see you only read two posts and responded to one this week. I encourage you to look at your time management. You have a really important perspective...”

Dropbox in the course shell was used to submit learning tasks, where students were able to upload a file or a record video/audio for their assignments. According to Heather, some of the students recorded video and audio to communicate with her. She reflected on that, saying, “I benefitted from getting to know the students on a different level because I could hear their voice,

I could see their face, that sort of thing.” Also, Heather was able to use the video feature in the Dropbox to provide feedback on the students’ assignments, as mentioned earlier.

Heather concluded that UDL implementation in online learning requires instructors to be instructional designers: “I do have a lot of academic knowledge in the area of [course content] but being a content expert is not enough...I need to be a designer of inclusive learning environments as well” in which students are able to engage effectively in the learning process.

Addressing student backgrounds and interests, identifying learning barriers, providing formative feedback and understanding the nature of the learning environment (e.g., online) were the main techniques used by Heather to successfully integrate UDL. Heather’s understanding of online learning pedagogy was reflected on using the CoI model. Online students need to be prepared and/or strongly motivated to demonstrate their knowledge in multiple formats (e.g., audio or video).

Instructor satisfaction. The three instructors were satisfied with their experience in designing and/or teaching the UDL-based program. They used these words to express their satisfaction: “I did not feel alone,” “I was very supported,” “I had a sense of belonging,” and “I loved the experience.” For example, Heather mentioned that although she was an online sessional instructor, she felt supported and connected to other instructors and administrators, saying “being an online instructor sometimes can be a lonely...Maybe you don’t feel valued by the institution you’re working for, and you’re kind of off on your own.”

Heather was also a sessional instructor at another institution. However, she did not have the feel of support and the sense of belonging to the institution in comparison to her experience in this program. She commented, “I felt more a member of the faculty, even though I wasn’t on

campus, than I did at [the name of other institution] when I was a sessional, teaching a course on campus.” According to her, when instructors feel support and a sense of belonging to their institution they are more motivated to contribute. Heather stated,

I did a lot of meetings before I actually signed my sessional contract, supporting the other teachers who were designing...I was willing to invest my time and do that because I felt like I was a valued member of the team, even though I wasn't getting any financial benefit from doing it.

Nancy also was satisfied with her experience in the program, “I did not feel alone, teaching in an online environment; that there were lots of people there that I could reach out to if I needed.” In addition, she commended the community approach that was used to develop the program as the instructors had a great opportunity to support each other. She said, “I have a community...because of the way [Lisa] has set it up, so we effectively communicate and share what we're doing, and we ask for feedback on what we're doing, so we're not alone.”

Susan was also satisfied with her first experience in online teaching in this program. According to her, this experience “pushed me outside of my own personal comfort zone of learning. That was a great thing.” She acknowledged the support received from Lisa and the previous online instructor: “lots of support from [Lisa]. If I had a question, she told me who to contact. Support from [the previous online instructor] for several questions at the beginning. Support from my team was amazing.”

Overall, two factors influenced instructor satisfaction. First, receiving support was deeply appreciated by the instructors, as they did not feel alone during UDL implementation. Second,

building a CoP influenced the instructor's sense of belonging and thus they were more likely to invest their time in developing their teaching capacity.

UDL integration assessment. The participants who had a direct role in the program were asked to assess the overall program in terms of UDL implementation. The data analysis indicated that UDL principles were successfully implemented and the program goals and desired outcomes were achieved. According to Karen, this program was “one of our very successful programs,” referring to the collaborative work on the design. Lisa also explained that the program successfully implemented UDL, although some work could be done to enhance future experiences. Heather explained that, “we might not have gotten it right in the first [iteration]...but because we took this design approach and iterative kind of thing, we just kept tweaking and improving, so by the last [iteration]...the program worked”.

The Academic Coordinator and three instructors conducted a curriculum review to assess whether the program had met the learning goals and outcomes. Data were gathered from curriculum mapping (i.e., program goals to graduate competencies, course outcomes to program goals, learning activities, and learner outcomes per course); a student survey (survey was sent to 51 students of whom ten completed the survey); and instructor analysis and feedback.

Overall, the Academic Coordinator and instructors' findings from the curriculum review indicated that program goals were achieved, and learning tasks were aligned with these goals. Several items were identified that scaffolded student learning and achievement of expected outcomes, such as ongoing formative feedback, extensive collaboration with peers, instructor-videos, and multiple reading materials.

However, one key area identified as needing improvement was to encourage more students to use multiple modes of expressions and demonstration as most of them seemed to prefer using the written format to complete their assignments.

A few challenges were mentioned during the interviews, such as bringing new instructors into the CoP for the program. According to Lisa, new instructors need to be hired in the program, which created some challenge. The new instructors had to become a part of the community and acquire UDL knowledge in a short time. It was evident that Susan did not feel a sense of community within the team, although she had a positive overall experience and received support from her colleagues.

Scholarship of teaching and learning. Based on the instructors' and the Academic Coordinator's experience in the program, they presented their work in several national and international conferences. One of the conference presentations was about using the CoP to support the design of the online program. The presentation demonstrated that the community succeeded through collaboration and ongoing professional conversations; instructors agreed to work collaboratively and committed to meeting on a regular basis. The positive outcomes of using the community approach were reflected in the iterative process of the program design, development of each course syllabus, student experience in the program, and instructor support for each other.

Another presentation was about using multimedia (e.g., videos) in the design and facilitation of online learning. Based on the presentation PowerPoint, the use of curated videos influenced student learning; moreover, the use of videos created by the instructor had an impact on the instructor's social and teaching presence.

Although these were sessional instructors who have other full-time jobs, they presented their work in several conferences, which reflected their satisfaction, sense of belonging, and/or willingness to invest their time to increase their teaching capacity. The scholarship of teaching and learning was an outcome of building a CoP, having an effective leadership role, and providing generous support.

Conclusion

This chapter presented the findings of a qualitative case study that explored how online instructors develop their teaching capacity to integrate UDL into teaching and learning approaches. Data were gathered from multiple sources: semi-structured interviews and documents. Participants were involved from multiple levels within a Canadian university to provide a holistic picture of the process of integrating UDL in online learning, that is, to explore and identify what types of resources and scaffolding were provided or needed to increase online teaching capacity, while identifying which types of support the participating online instructors used.

In general, online teaching was supported at the faculty and university (institution) level. Multiple types of support were offered such as informal short conversations, formal workshops, extension programs, and one-on-one technology coaching. The participating online instructors used some provided supports, coupled with their own experience of being online students, to inform their online teaching practice.

What was evident from the data analysis was that academic leaders and instructors shared common perceptions of the characteristics of successful online learning such as building a

community for students, having strong teaching presence, and providing clear expectations and requirements which was reflected on the UDL-based program.

In terms of UDL integration in online learning, most of the participants agreed that sufficient preparation and ongoing support needed to be offered. Since the instructors had extensive knowledge about UDL before their experience on the UDL-based program, they did not need pedagogical support to acquire UDL knowledge. However, what was new for them was applying their UDL knowledge in an online higher education context. Therefore, a CoP was built as an educational development approach to support those instructors in increasing their teaching capacity to design and facilitate the online program. The effective leadership of the Academic Coordinator influenced the maintenance of the community and instructor satisfaction. Because of their engagement in the CoP, the sessional online instructors and the Academic Coordinator presented research on their experiences at several conferences.

Verification of the Case Report

The case report was sent to the nine participants in the study. They were asked to review the report and to provide comments and/or feedback to ensure the accuracy of the information and descriptions that were used in the research analysis. Seven participants responded that they had read the report. Three of the seven participants made some minor editing regard their interview quotations. Two participants suggested change the previous pseudonyms for the participants to ensure anonymity. Given no other constructive feedback was provided, it can be assumed the case report accurately captured the phenomenon of increasing teaching capacity for UDL integration.

CHAPTER FIVE: DISCUSSION

Introduction

The case study explored how instructors developed their teaching practice to implement UDL in the design and facilitation of an online graduate program, while examining the role of the academic institution (i.e., academic leaders, teaching development providers) in fostering UDL implementation and supporting such development processes. The study aimed to answer the main research question: How do instructors develop their capacity to design and facilitate online learning using UDL principles? Three sub-questions were used to help in data analysis and discussion:

- What is the role of academic institutions (e.g., leaders, instructional designers and development providers) in supporting online instructors to effectively integrate UDL principles into their teaching and learning approach?
- What structures and scaffolds are required to support UDL implementation in online learning?
- What are key factors that need to be in place to design a flexible online learning environment that meets UDL principles?

This chapter provides a discussion of the findings as they pertain to each research question. The results are discussed in relation to the literature review on online learning, leadership, UDL, and educational development for online instruction. The chapter concludes with a developed framework based on findings from the study, supported by the relevant research literature to guide higher education to foster UDL incorporation in online learning.

The Role of an Academic Institution in Support of UDL Integration

The first research question focused on exploring the role of an academic institution represented by academic leaders, instructional designers, and development providers in fostering UDL infusion in online learning environments. It was evident from the data analysis that academic institutions play a critical role in supporting the development of online teaching capacity as well as fostering UDL integration. Effective leadership was reflected in the level of support and generous resources whether at the level of program, faculty, or institution.

The literature indicated that leadership influences the quality of online learning (Baran & Correia, 2014; Johnson, et al., 2014; Scott & Scott, 2015) and “low administrative support was one of the identified key factors [that] impacted sufficient educational development for online teaching” (Johnson et al., p. 22).

Four main features of effective leadership’s role in supporting UDL were identified:

- 1) Having a clear vision and strategic plan;
- 2) Providing appropriate customized support;
- 3) Creating enabling conditions and opportunities to increase teaching capacity; and
- 4) Rewarding teaching excellence.

Also, findings from the study revealed that leadership presence is needed at multiple levels: institution, faculty, and program. At the institution level, the role of leaders involves creating a clear vision, preparing strategic plans and policies, establishing a recognition and reward system, providing the required technological infrastructure, and offering sufficient resources.

In my study, David, Karen, and Sarah, who are academic leaders, reiterated that successful UDL integration in higher education starts with creating a clear vision and strategic plans. Educational development opportunities are then aligned with that vision. Ideally, UDL would be adopted across programs and faculties; otherwise it has little chance of success in individual programs.

Similarly, Goforth-Melroy (2014) argued that providing strategic plans for UDL integration facilitates the adaptation process across faculties within a university, along with recognition and award systems to acknowledge successful implementation. Scott and Scott (2015) also found that to increase quality teaching in a university, a clear vision needs to be in place, and resources and direction must be offered to improve instructional and assessment practices to build teaching capacity in contemporary pedagogy. They found that instructors need strong incentives to engage actively in learning and thus enhance their teaching practices. Two types of recognition could be used: 1) informal, which includes teaching awards and prizes, and 2) promotion and tenure criteria that reflect the institutional vision toward quality teaching (Scott & Scott, 2015).

Providing technological infrastructure is vital for supporting UDL implementation in online learning. LMS is one of the main components of online learning. Thus, thoughtful consideration needs to be given in the selection of LMS at the institutional level; and then appropriate support should be offered to help instructors in understanding the features of the LMS and teach effectively with it. As Jaibal, Figg, and Burson (2012), noted meaningful support enables instructors to teach “WITH the technology rather than just be able to use the technology” (p.4714). Also, people who provide the support need to have sufficient understanding of UDL

and its application to better assist instructors in designing their course shells and facilitate student learning.

In terms of resources, findings from my study demonstrated that online teaching was supported at the institution level as represented by the teaching and learning centre, which offers multiple types of educational development opportunities (e.g., OTPP, Instructional Design Programs, Online Teaching Awards, and Teaching and Learning Grants). The instructors used some of these opportunities to develop their online teaching skills. For example, Heather, one of the online instructors, used the institution's OTPP to develop her online teaching skills. According to her, "that was a very good support...in designing the course".

At the faculty level, the role of leadership involves providing customized educational development opportunities (i.e., providing one-on-one technology coaching, hosting educational conversations, building a network of people, having technological infrastructure, mentorship, consultations, etc.). For instance, Karen, who is an academic leader, explained how her role involved ensuring that the technological infrastructure and educational development support is in place for online instructors to promote success. According to her, "I may not be the one that's providing those supports...but my job is to make sure that there's a coordinated effort and that [online instructors] know where to get the supports that they need," whether in the faculty or the institution's teaching and learning centre.

Lisa identified multiple opportunities offered to support online teaching in the faculty, including, but not limited to, formal workshops, one-on-one technological coaching, and informal weekly conversation sessions to "build a network of people who can support each other, but also for new people to come in and talk."

The participants (i.e., two instructors, three academic leaders) in the study recommended hosting educational conversations to increase the awareness of learner variability, solving misconceptions related to UDL, and sharing current practices toward inclusive education. For instance, Lisa reported, “opening conversations with academics around the nature of student learning, using the principles of UDL is a piece of work we really do need to work more on.”

These conversations may lead to a real change in higher education (Palmer et al., 2010). According to Sarah, these conversations need to be supported by empirical study findings, as most higher education is research-intensive. Through those types of conversations, academic leaders would be in a better position to ascertain the degree of instructor responsiveness toward a UDL-based teaching and learning approach, and thus determine the types of support and resources required.

Developing buy-in from instructors through these discussions is a critical component in UDL incorporation. Instructors need to see the value of UDL and understand the method of practice in order to change their traditional way of teaching (Bowman, 2016; Goforth-Melroy, 2014). These types of opportunities enable instructors to present their ideas, negotiate their perspectives, and share their practices to learn with and from each other. According to Palmer and his colleagues (2010), outcomes of educational conversations between colleagues could be disseminated beyond the campus through sharing ideas and practices in public (e.g., conferences, faculty meetings, teaching portfolios, and the Internet).

To structure support for online teaching at the faculty level, there was an assigned full-time faculty member, who acts as the Academic Coordinator for each online program to support individual instructors. According to Karen, “[A] lot of one-on-one mentoring for teaching online

happen[ed] with the Academic Coordinator and the individual instructor.” Therefore, the role of leaders at the program level involves supporting individual instructors through various ways such as conducting one-on-one consultations, having clear expectations of the program requirements, building a community within the program level, and providing formative feedback. Lisa, the Academic Coordinator, explained that her role involved “making sure our instructors feel supported, [and] feel they have access to appropriate professional development opportunities to meet their particular needs. That might be one-on-one with a coach, it might be one-on-one with [me],” or it might be just directing them to the available resources.

Specifically, the Academic Coordinator supported the development of teaching capacity in this UDL-based program through having clear expectations and requirements of the program (i.e., collaborative design process, regular meeting for reflections, providing peer feedback, and modeling UDL), providing ongoing formative feedback, and creating a CoP. Because of this support, instructors were satisfied with their experience in designing and teaching in the graduate level program. Moreover, they—along with the Academic Coordinator—presented and published their work in several conferences.

Engagement in form of knowledge mobilization could be considered an outgrowth of their scholarship of teaching. Instructors develop their scholarship of teaching through documenting their practice and validating their knowledge in peer-reviewed venues. As Shulman (2000) stated, “we develop a scholarship of teaching when our work as teachers becomes public, peer-reviewed and critiqued. And exchanged with members of our professional communities so they, in turn, can build on our work. These are the qualities of all scholarship” (p.50). Having

such a satisfactory experience was an outcome of the effective leadership role of the Academic Coordinator, as recognized by the participants.

Although UDL implementation in higher education needs to be “faculty-driven,” it should be coupled with institutional support for campus-wide adoption (Bowman, 2016). Buy-in is needed to encourage individual instructors to learn about UDL theory and practice and redesign their courses. Without buy-in from faculty, UDL would not be effectively incorporated. Only with institutional support (i.e., policy, resources, budget, educational development opportunities) would UDL become a campus-wide approach.

UDL integration is more than applying the three main principles in the design of a learning environment, however; it requires creating a culture of expertise. Expertise, in the UDL context, refers to “a process of becoming more expert on a continuum of development” (Meyer et al., 2014, p. 23). Creating a culture of expertise needs a supportive system or ‘expert system,’ that is designed to encourage learning and foster collaboration and community to maximize learning opportunities for its members (e.g., administrators, instructors, support staff) (Meyer et al., 2014).

In my study, the Academic Coordinator established an expert system within the program level by creating a CoP. From the beginning, the instructors along with the Academic Coordinator agreed to collaboratively design the courses and support each other’s development practices. They met regularly also after each course to reflect on what worked, what did not, and how to enhance the upcoming course. Such reflective activity provided an opportunity for the instructors to think critically about their teaching practice and thus further develop their skills. As Nancy observed, “the meeting before and after and having that time to really just reflect on:

What went well, what didn't, what would I change, how do I feel about some of these pieces, was an incredible opportunity for growing perspectives.”

This team demonstrated their learning expertise through their motivation to continually develop their practice. As one example of development practice, Heather mentioned that in the first iteration of the program she only used YouTube videos to provide multiple means of representation. However, in the second iteration, she started to create videos to interact with her students whether publicly through weekly discussion or individually to provide feedback to her students.

The Academic Coordinator also expressed her insight into the development practice by saying, “I think we’re on the right track, I think we’re doing the right things, but I think there’s more to be done”. Such development practice is reflective of meeting Meyer et al.’s (2014) definition of an expert learner/teacher as “someone who is continually growing and developing through introspection and guided feedback from other experts and peers” (p.26).

Summary. Academic leaders play an important role in fostering UDL integration in online learning environments. Effective leadership is reflected in generous support and sufficient resources, which thus influence the quality of teaching and learning. In general, supporting UDL integration in online learning could be achieved through multiple types of educational development opportunities at multiple levels ranging from formal intensive programs to informal conversations, and from group support to one-on-one coaching. A clear vision, strategic plans, appropriate customized support, technological infrastructure, enabling conditions and opportunities for learning, and rewards are the main features of the effective fostering of UDL implementation. Through efficient communication and collaboration between and among

multiple levels of leadership within a university, sufficient support is offered to meet individual needs.

Supporting UDL Implementation in Online Learning

The second research question focused on required structures and scaffolds to support UDL implementation for online learning. The findings indicated that there were various ways to support UDL incorporation. Fostering UDL starts with supporting online teaching to equip instructors with the required skills and knowledge to understand the notion of online learning environments so that they would be more likely to implement UDL principles. The aim of supporting online teaching is to assist them in navigating online learning with desired skills, experience, and confidence (Vaill & Testori, 2012). Instructors need to understand online pedagogy to effectively incorporate UDL into online teaching and learning approaches. As Heather mentioned, the OTPP helped her in understanding the online pedagogy and thus assisted her in the design of the course. Both instructors, Nancy and Heather demonstrated their knowledge of online pedagogy through talking about social presence, sense of community, and instructor presence. Multiple forms of educational development could be provided for instructors to assist them develop online teaching expertise including but not limited to OTPP, building communities for educational development (e.g., CoPs), and peer mentoring (Carter, 2014; Herman, 2012; Roman, Kelsey, & Lin, 2010; Taylor & McQuiggan, 2008; Vaill & Testori, 2012).

Findings from the study demonstrated that online teaching was supported at different levels through multiple opportunities ranging from informal sessions to formal programs, from group support to one-on-one coaching, and from basic online teaching skills to advanced

scholarship of online teaching. For example, the OTPP was offered at the university level for instructors to develop their online teaching practice by exploring online pedagogy, examining current technological tools, having the experience of being an online student (e.g., engaging in weekly discussion, submitting learning tasks), and discovering how to design and facilitate online learning. According to Heather, “that was a very good support for [her] in designing the course.”

One of the strengths of OTPP was the involvement of pedagogical and technological aspects of online teaching, which were recommended by Schmidt, Tschida, and Hodge (2016), Taylor and McQuiggan (2008), and Vaill and Testori (2012). OTPP was also delivered fully online to give instructors the lived experience in an online environment by engaging them in multiple learning tasks and having the opportunity to be an online student. Having the lived experience provides an opportunity for instructors to gain the student perspective and to appreciate how the student would experience the nature of the learning. This design of educational development program was suggested by several scholars (e.g., Roman, et al., 2010; Wolf, 2006).

Another type of support reported by the people in the study was the one-on-one learning technology coaching to assist instructors explore the functionality of the LMS and design their course shells based on their own needs and preferences. Moreover, there was also a specified technology support called Distance Help for each scheduled synchronous session. The person from Distance Help was hired by the faculty to ensure all graduate students were able to log in and use their microphones, as well as help the instructor to manage the synchronous session. As Nancy stated, “sometimes I was stressed on the night of the [synchronous] sessions, because I

wanted things to flow well, and they were [Distance Help] very good about making me feel supported, and taking some of that stress away.” Additionally, there was an assigned Academic Coordinator for each graduate online program to mentor individual instructors along with the Distance Programs Coordinator.

Similar to Johnson et al.’s (2014) observation, developing online teaching capacity requires more than a couple of workshops. It requires ongoing support, and should not only be offered to novice online instructors, as experienced online instructors need to keep developing their proficiency (Vaill & Testori, 2012). Engaging several support people at the program, faculty, and university (institution) level is needed. The various people involved at each level have different roles to play, which results in a more complex and comprehensive form of support for online instructors.

In addition to online teaching support, instructors need to deeply understand UDL theory and its application in the design and facilitation of online learning. Rose et al. (2006) explained, “UDL requires that we not only design accessible information, but also an accessible pedagogy” (p. 2). Putting the theory of UDL into practice in online learning environments may create challenges for educators (Ostrowski et al., 2017). Findings from my study revealed that supporting UDL integration could be achieved through strong leadership, ongoing formative feedback, a CoP, and a variety of educational development opportunities.

Effective leadership supports instructors to develop their teaching capacity. It needs to be responsive to individual instructors’ needs through creating learning opportunities, providing formative feedback, and ensuring sufficient resources are in place. For example, Lisa explained that in her role as an academic leader, she was involved in “creating opportunities for instructors

to come together to learn about UDL...ensuring that whoever provides them with technical and pedagogical support has an understanding of UDL...looking at their design, and giving them feedback.”

The involvement of academic leaders in fostering UDL implementation may motivate instructors to adopt such approaches. As Julia said, having the support of leaders “is really important because if you had an academic leader who may not necessarily be an advocate for [UDL], you’re not going to get anywhere...because faculty will say my Department Head doesn’t really care, so why should I care?”

Providing ongoing formative feedback throughout the UDL implementation process, from the design of a learning environment to the facilitation of learning processes and ending with the assessment of learning outcomes, is recommended. For instance, Susan highlighted the importance of ongoing formative feedback, specifically at the end of the course or UDL implementation. She recommended “a check-in toward the end might be a useful way for administration to track how” UDL was implemented, because “we can all say at the beginning ‘oh yes, I’m going to do this and this,’ but a check-in towards the end might be helpful, and pull the person’s attention back” to assess the UDL implementation process. Nancy also stated that instructors should not feel isolated during UDL implementation. Rather, they should be able to ask their academic leaders for advice and get feedback on their UDL integration. Formative feedback would be given by colleagues and academic leaders, as happened in this case study. As Heather mentioned, “we were bringing forward our draft syllabus, and sharing them with each other for feedback, or looking at resources.” Nancy also reported, “we got feedback, and it was

feedback in a very collaborative sense...I think that when you're open to critical friends, it grows you as an educator."

Furthermore, after each semester/course, instructors and the Academic Coordinator met to reflect about what teaching practices worked, what did not work, and how to enhance the upcoming experience. Such reflective development practice enabled instructors to access their strengths and weaknesses, learn from each other's experiences, and receive peer feedback.

Using a CoP (Wenger, 1998) as a development approach facilitates UDL integration in online learning as instructors develop their capacity through learning from and with each other, exchanging resources, providing formative feedback, and seeking help. In my study, a CoP was formed to create a supportive learning environment. In this CoP, online instructors and the Academic Coordinator met regularly to collaboratively design the program and reflect on their teaching practice. From the beginning, there was an agreement and commitment to effectively collaborate and support each other. According to Nancy and Heather, having this community enabled them to incorporate UDL gradually over several iterations. Regular meetings, commitments, collaboration, trust, and common interests were the main attributes of the CoP in my study.

The literature review indicated that CoP was used successfully in higher education to develop teaching expertise (Carter, 2014), and specifically it was recommended to be used in developing online teaching capacity. The CoP "is more than a series of training workshops, instates, meetings and in-service days. It is a process of learning how to put knowledge into practice through engagement in practice within a community of practitioners" (Schaler & Fusco, 2003, p.205).

Wenger (1998) identified three key elements that formed effective CoP: joint enterprise, mutual engagement, and shared repertoire. In my study, the participants (i.e., online instructors and the Academic Coordinator) had a shared common interest, which was incorporating UDL into their online teaching and learning approach. As Heather said, “the conversation was always around: Are we really modeling, are we leveraging the UDL framework in our work.”

The team engaged in regular meetings face-to-face and online via Skype to discuss their concerns, share their experiences, and help each other. Heather also noted that “we really supported each other in designing our courses...we would get together and we’d debrief. I felt that I had a much better understanding of the learners that I was coming in to support.” Through their mutual engagement, the instructors developed their course outlines and reflected on their teaching practices to best meet UDL principles. As Nancy explained “we developed some of the things we were doing, and passed them back and forth, and we got feedback.”

A successful CoP requires a facilitator to provide support and guide discussion and activities to accomplish desired outcomes (Cheng & Lee, 2014). The Academic Coordinator, Lisa, was the facilitator of the CoP. Heather described the role of the CoP facilitator: “[Lisa] encouraged us to come together as a community of online instructors, supporting each other. She really created those enabling conditions where she helped us get to know each other, and build trust, and do meaningful work together.” Nancy also acknowledged Lisa’s role as a facilitator of CoP stating, “she is very enthusiastic and supportive, and created opportunities for us to come together, and sort of insisted on it, which was really great.” Having a lead person in a CoP is recommended to facilitate the process and achieve desired outcomes.

Similar to Carter's (2014) research, findings from my study supported that the use of a CoP as an educational development approach influences online instructors' sense of belonging to the institution/university. It also helped to foster the motivation to continually develop their teaching practice, and resulted in them feeling satisfaction. For example, Heather reported,

Being an online instructor sometimes can be a lonely...Maybe you don't feel valued by the institution you're working for...By this [UDL-based program] and us coming together really as a collaborative team, I felt like I was really valued by the faculty.

Further, she rationalized that when instructors feel supported and have a sense of belonging to their institution, they are more motivated to invest their time to contribute to it. Nancy also had a satisfying experience in teaching in this program due to the use of CoP. She expressed, "I did not feel alone teaching in an online environment... I have a community... we communicate a lot, and we share what we're doing, and we ask for feedback on what we're doing, so we're not alone." Creating a CoP aimed to provide a supportive learning environment for instructors to build their teaching capacity to effectively implement UDL.

Providing a variety of educational development opportunities is needed to equip instructors with sufficient knowledge and skills to redesign their courses based on UDL. Pedagogical support needs to be offered to increase the instructor's understanding of the notion of online teaching and UDL application. For example, Karen said, "we need to have strong faculty development, we have to have opportunities for faculty to learn these principles to adopt some of the practices."

Lack of UDL knowledge was reported as that the main challenge of UDL integration by Julia, Nancy, and Lisa. Also, common misconceptions regarding UDL exist, which generated a

need to increase the awareness highlighted by Nancy and Lisa. Nancy mentioned that instructors “need to get over that it has to be one-size-fits-all; otherwise how would it be fair?” Further, they need to understand “that it’s okay to have variation in how people demonstrate their knowledge, without feeling that somehow it’s unfair.” Therefore, increasing the awareness of UDL is essential in fostering its application. Schelly et al. (2011) and Davis et al. (2015) found, increasing the awareness of learner variability positively impacted instructors’ teaching practice, as they used multiple types of representations and provided more formative feedback to their students.

Technological support additionally needs to be in place to assist instructors explore how technological tools aid in facilitating UDL implementation. For instance, Heather said “we can’t assume that even though instructors are passionate about UDL and they want to try and use that in their course...they can figure out how to leverage all of the affordances within the [LMS].” Such support needs to be flexible and customized to reach the individual needs and preferences of each instructor. Julia recommended that development support needs to be flexible and low risk, and it needs to be “tailored training...so [instructors] can fit it into their schedules and that they can devote time to it.” One-on-one technological coaching could be offered to help individual instructors redesign and/or customize their course shells to best meet UDL principles. People who provide such support need to have background knowledge of UDL to effectively assist instructors in meeting UDL principles.

Findings from my study revealed that meaningful UDL implementation occurs through iterative processes. Nancy mentioned, “even when I come from a background of deep understanding of UDL, each time I have taught the course I have expanded pieces to make sure

that it gets designed further to the edges.” Furthermore, Sarah strongly recommended instructors to teach the same course more than once to effectively develop their UDL implementation. This finding is congruent with Ostrowski et al.’s (2017) study in which they found using iterative processes for UDL integration enabled them to achieve desired outcomes as they identified strengths and weaknesses after each iteration, and were then in a better position to foster their design. Similarly, Bowman (2016) found that when instructors make small changes to their design and then observe their effectiveness, they are more willing to invest their time to redesign the entire course. As a result, sufficient time needs to be given to effectively incorporate UDL, since instructors need to gain knowledge and practice UDL gradually.

Summary. Fostering UDL implementation in online learning can occur through strong leadership, ongoing formative feedback, building a CoP, and providing a variety of educational development opportunities. Specifically, instructors need to be equipped with sufficient knowledge and skills for successful UDL integration. Understanding online pedagogy, learner variability, and UDL theory is essential for effective integration. Educational development support needs to be ongoing and varied in their topics, intensity, and length. In addition, customized support is recommended to meet individual needs such as one-on-one technological coaching and consultations with experts and leaders.

UDL implementation is an iterative process that requires sufficient time, ongoing feedback, and generous support. A CoP could be used as educational development approach as instructors communicate regularly to share their practice, exchange resources, seek help, negotiate their perspectives, and provide peer feedback.

Designing Online Learning Environment Based on UDL

The third research question of the study asked what key factors need to be in place to design a flexible online learning environment that agrees with UDL principles. Findings from the study indicated that online pedagogy along with UDL principles need to be carefully considered to design flexible and accessible online learning. Consideration of the nature of online learning and its pedagogy was missing in the UDL literature that focused on online learning. Having a sense of community, building an effective instructor presence, sharing teaching presence with students, considering learner variability, identifying learning barriers to be removed, and applying UDL principles were the key factors identified to design a fixable inclusive online learning environment. Each of these factors is discussed in the following paragraphs.

Most of the participants identified a “sense a community” as a characteristic of successful online learning. David said having a sense of community is “an important indicator of how successful an online instructor has been.” Similarly, Palloff and Pratt (2007) argued that “without the support and participation of a learning community, there is no online course” (p. 40). Online learning is more than accessing content; rather it is about interacting with content, instructors, and peers to acquire knowledge (Ally, 2008). Having a sense of community supports collaborative learning and discourse associated with a higher level of learning (Garrison & Arbugh 2007; Shea, 2006). The literature review clearly indicated that online learning communities play a critical role in student satisfaction, sense of belonging, quality of learning, and retention (Garrison & Arbugh 2007; Rovai, 2002, Shea, 2006, Wilson et al., 2004). Therefore, careful attention needs to be given to the role of community in online learning as it influences students socially and cognitively (deNoyelles, Zydne, & Chen, 2014). “Community

is not a product or entity that can be built. Rather, it is a process that is organic in nature...it depends on relationships and building relationships” (Lock, 2003, p. 12).

To establish a sense of community, Garrison (2006) recommended designing social learning activities for students to interact formally and informally to build social relationship. Nancy explained that students need to feel safe and that their contributions are valuable to feel a part of a community. However, Lisa stated, “[n]ot all students will be at the same degree in there [a community], but...there’s some great value, especially at the graduate level, that there is [a] shared ownership for the learning.”

The instructors Nancy and Heather were both keen to create a sense of community in their online courses. According to Nancy, having a sense of community and peer support in online learning enabled students to engage in learning within the UDL approach as they recognize their diversity, support each other, and acknowledge each other’s contributions. She emphasized this to her students by stating “in this course, it is important to recognize that people will be coming from different perspectives and different journeys,” underscoring that every contribution is valuable.

Six participants in the study believed that instructor presence influences online learning success. The research literature indicates that instructor presence has an influence on student satisfaction, sense of connectedness, and engagement (Altowairiki, 2013; Shea, et al., 2006; Lear, Isernhagen, & LaCost, 2009). To establish instructor presence, the participants in my study identified multiple strategies such as having a virtual office hour, responding to emails in a timely fashion, participating in weekly discussions, and providing ongoing feedback. Moreover, providing clear expectations of instructor involvement (e.g., timeline for responding to emails,

participation in weekly discussion) was recommended by Nancy. On the other hand, it is important to highlight that online instructors need to balance their presence, so they leave room for students to interact and construct/gain knowledge and do not dominate interactions.

Sharing teaching presence responsibility with students was recommended by three participants. According to Jodi, students should share some responsibility of online teaching presence as they co-construct knowledge by exchanging resources, support each other, and provide peer feedback. This finding coincides with previous literature on the subject (e.g., Garrison, 2011; Redmond & Lock, 2006). Nancy shared some teaching responsibilities with her students as they were asked to search for multimedia resources that aligned with the weekly modules and share them with others to enrich the learning experience for their classmates.

To help students clearly understand desired expectations and thus effectively take part in teaching presence, modeling was recommended by the participants. For example, Lisa stated, “in terms of the discussion board, you should give them some exemplars, showing them, talk about what makes a good posting...modeling that, encouraging students to be working in those ways.” This is consistent with a study by Altowairiki (2013). She found that modeling desired expectations was one of the factors that influenced student success; as one student in her study expressed, “That was really helpful for us to be able to see what we needed to do. Instead of just telling us what to do, being able to see it in action” (p.80). Sharing teaching responsibility with students is recommended in online teaching literature. To effectively prepare students for such learning environment, modeling desired expectations is required.

Considering learner variability in the design of online learning was recommended by four participants. Online learners are varied in their backgrounds, experiences, learning preferences,

and expectations. For example, Nancy said, “you may have a person who’s in their first year [of] teaching, you may have a person who has never taught, and you may have a person who has 25 years teaching.” Susan had a similar observation reporting, “they’re not in a classroom, they’re not sharing experiences, the context is different for everyone, their background, their experiences were so different.”

These findings align with Rao (2012), and Rudestam and Schoenholtz-Read (2010) who considered online learners to be non-traditional due to their variances in abilities, experiences, expertise, learning preferences, prior knowledge, non-academic commitments, and distance from institutions. Therefore, Karen recommended, “offer[ing] diversity in the content, the ideas, the resources that the student can make connections with their current interests or their current occupations.”

Considering such variability in the design and facilitation of online learning is a fundamental step toward an inclusive learning environment. Nancy mentioned that having an inclusive design that considers learner variability influences students’ sense of community in which they have a sense of belonging and their contribution is valued. To design inclusive learning, pre-course assessment could be carried out to identify student interests, backgrounds, and learning preferences. For example, Heather made a pre-course survey and modified the course design (e.g., reading materials, weekly discussion, etc.) based on the results. Online students’ diversity needs thoughtful consideration in the design and facilitation of online learning.

Identifying learning barriers to be removed in the curriculum or learning environment assisted instructors to design inclusive and accessible online learning, as Nancy and Heather

explained. According to Nancy, “the problem here is not the student, the problem here is the curriculum. If we can open up this curriculum for this student, then the student can perform, and show us the knowledge.” For example, time stresses could be a learning barrier in online environments, as students have other family and work commitments as Nancy explained. Thus, she was flexible in due dates, stating “I did have deadlines, but they were approximations...Most people try to go with the deadline...but the few people who needed that extension weren’t stressed so much because they knew that they had that little bit of flexibility.” Through identifying learning barriers, instructors are in a better position to design accessible learning environments.

In terms of applying UDL principles, providing multiple types of engagement, representation, and expression, Heather and Nancy used a variety of techniques. UDL principles are broad so that instructors are able to select the tools and methods to meet them based on their course objectives and goals.

To provide multiple means of engagement, synchronous and asynchronous communication tools were used. Incorporating both types of communication forums in the design of online learning is recommended by several scholars as synchronous discussion assists in building social presence, while the use of asynchronous discussion provides flexibility for students to participate at any time (Altowairiki, 2013; Anderson, 2008; Palloff & Pratt, 2007; Rockinson-Szapkiw et al., 2010). Twitter also was used to assist students in building their personal learning environment and build a network with experts in the field. Heather, for example, created a course hashtag and tweeted regularly throughout the course, retweeting key

people in the field. There was evidence that students engaged with Twitter to construct knowledge, as some of them used Heather's tweets to reflect on in the weekly discussion.

In addition to using multiple types of communication tools, every weekly module included options for readings and discussion questions that students could select to reflect on based on their interests. For example, Heather had weekly optional readings for students who were interested in more deeply investigating the assigned topic. She told her students, "If you feel like the required readings didn't really add anything to your body of knowledge you already have in this module, challenge yourself to the optional readings." Using several types of communication forums along with options for reading materials and discussion questions were some of the used techniques to provide multiple means of engagement.

To provide multiple options of representation, videos, images, and Microsoft PowerPoint slides were used. For example, in Heather's course design, each weekly module started with an introduction of the assigned topic, "in case [students] had no background area." Some questions were then provided to scaffold student thinking while they read the assigned articles, watched multimedia resources, and reflected on the weekly discussion. According to Heather, such a scaffolded approach supported students "in being focused in their reading, and more metacognitive." Students were actively engaged in using multiple methods of representation. For instance, Heather added some weekly videos and asked her students to select one or two to watch. According to her, "most students chose to watch all of them, actually, even though they didn't have to watch all of them...that shows a higher level of engagement; they were curious and interested."

Nancy also shared some teaching presence responsibilities with her students as she asked them to search for multimedia resources that aligned with weekly context to share them with their classmates to enrich the learning experience.

In terms of providing multiple means of action and expressions, students were encouraged to use multimedia to express their weekly reflections instead of relying only on the text-based format. For instance, Nancy asked her students to illustrate their knowledge in a variety of ways such as poster presentations, Microsoft PowerPoint, Prezi, or videos. Moreover, Heather modeled the use of multimedia formats in her weekly reflections through creating weekly videos. Few students used formats other than text to express their knowledge, but some used video and audio formats to communicate individually with the instructor. Online students may need some preparation to use multimedia to express their knowledge; for example, they may need to know what criteria need to be considered in creating videos, how to create video posts, or which technological tools can be used to express knowledge.

In terms of the final assignment, Heather and Nancy had different approaches. Heather for instance, did not provide multiple options for students to express their knowledge in the final assignment other than writing a research paper, as it was one of the course goals. Thus, to scaffold students' writing, feedback and guidance were provided throughout the writing process, from choosing a research area to selecting peer-reviewed papers. On the other hand, Nancy provided multiple options for students to fulfill the requirements for the final assignment, and they could select writing a research paper or an equivalent alternative format. Students were required to first discuss their selected format with Nancy and get her approval. Feedback and

guidance were provided throughout the learning process. According to Nancy, 40 percent of the students used a format other than writing a traditional research paper.

Based on learning objectives and goals, instructors can select methods and tools that reach UDL approaches. Ongoing feedback is key in scaffolding meaningful learning. As Nancy highlighted, online learners need to have “choice, and safety in that choice.” Safety in choice refers to providing formative feedback to give students some affirmation and guidance for their choices.

Instructors need to understand the functionality of the LMS to implement the UDL principles in a thoughtful way. Some LMSs permit the use of multimedia (e.g., graphic, video, audio), while others do not. Therefore, instructors “should be creative and resourceful in designing flexible learning environments that address the variability of learners using a range of high-tech and low-tech solutions” (National Center on Universal Design for Learning, 2014b, para.3).

The instructors in this study were varied in their level of use of the LMS features. Heather, for example, used video format to communicate with her students to provide feedback or participate in the weekly discussion, while Nancy did not. Such observation does not imply that the use of “high-tech” (e.g., video format) had better outcomes (e.g., student learning, UDL integration). Rather, it shows how each instructor applied UDL principles uniquely in their LMS. Each UDL implementation case is unique and depends on instructors, students, learning environment, curricula, and resources.

Summary. Six factors need to be considered in designing and facilitating online learning based on UDL framework. Some of these factors are related to online pedagogy such as having a

sense of community, building instructor presence, and sharing teaching presence with students; other factors are related to UDL theory such as considering learner variability, identifying and removing learning barriers, and applying UDL principles.

UDL is a general framework that allows instructors to interpret its principles through selecting methods and tools that best fit their course goals and objectives as much as they meet the three principles. Offering options for engagement, representation, and expression, along with providing ongoing feedback, foster UDL integration in online learning environments.

Framework

Based on the findings from my study along with evidence gleaned from the relevant and appropriate research literature, I developed a framework to visualize the fundamental components that support and foster UDL incorporation in online learning environments. The framework consists of three key elements: leadership, CoP, and knowledge and skills. At the centre of these elements is the integration of UDL, which will provide a Universal Design learning experience.

Three areas intersect:

- 1) Facilitation resulted from effective leadership in forming and nurturing a CoP;
- 2) Support offered by leadership to enhance knowledge and skills; and
- 3) Collaboration developed knowledge and skills from and within a CoP.

Figure 2 outlines the relationships among the elements.



Figure 2. Fostering UDL infusion in online learning framework

Leadership. To foster UDL incorporation in online learning, effective leadership is needed at multiple levels: institution, faculty, and program to ensure infrastructure, resources, and educational development are in place to support instructors develop their knowledge and skills regarding online teaching and UDL incorporation (Bowman, 2016; Goforth-Melroy, 2014). General support including—but not limited to a clear vision, strategic plan, reward system, educational development resources—could be offered at the institution level for development of teaching capacity among faculties within the institution. In contrast, specific customized support would be offered to address needs within the faculty level such as mentorship, one-on-one consultation, workshops, CoP, and educational conversation sessions. Furthermore, individual

instructors need to be guided and supported throughout the UDL implementation process at the level of the program. Effective collaboration and communication between and among multi-level entities provides complex and comprehensive support.

Community of practice. Creating a CoP for instructors facilitates the UDL implementation process. In a CoP, instructors support each other's development process through presenting their ideas, sharing their practice, exchanging resources, and providing formative feedback. CoPs foster a professional learning environment in which members share a common interest/need and internal motivations, and thus collaborate to solve professional problems of practice (Carter, 2014). According to Johnson (2001), knowledge that evolves from learning in a CoP is collaborative in nature, which is greater than any individual knowledge.

However, effective CoP requires successful facilitation in terms of process and content (Cheng & Lee, 2014). Content facilitation guides the content of activities and discussion to ensure they align with the CoP domain to develop a shared repertoire and construct knowledge (Cheng & Lee, 2014). Process facilitation refers to providing general and/or structural support (Cheng & Lee, 2014) for members to facilitate their mutual engagement to produce a shared repertoire regarding their joint enterprise. A CoP could be formed within a faculty level or be extended to the institution level.

Knowledge and skills. Understanding UDL theory and its application is essential for design of accessible learning. Instructors need to be equipped with sufficient knowledge and skills to successfully design an inclusive learning environment and facilitate accessible learning (Edyburn, 2010). By understanding the notion of online learning and online learner variability

and how technological tools can be used to foster engagement and interaction, the learning experience can be enhanced, which is critical for successful online learning.

Online instructors need to develop “deep understanding of the relation between the technology and pedagogy that come together in effective practice” (Koehler et al., 2004, p.28). Specifically, the TPACK model (Mishra & Koehler, 2006) outlines three main areas of knowledge as essential for online instructors:

- 1) Technological knowledge,
- 2) Pedagogical knowledge, and
- 3) Content knowledge.

Moreover, online instructors need to understand the relationships and intersections between and among each of these three areas, resulting in more four areas: pedagogical content knowledge; technological content knowledge; technological pedagogical knowledge; and technological, pedagogical, and content knowledge.

Mishra and Koehler (2006) explained that each component of the TPACK model should be understood individually and in conjunction as thoroughly as possible. Acquiring such knowledge could be achieved through independent learning, workshops, consultations, intensive programs, coaching, and mentorship. Putting knowledge into practice is critical and it may require ongoing support to guide instructors throughout the process. Building a CoP helped instructors transform apply their knowledge of UDL in online teaching and learning practices.

Conclusion

This chapter discussed the findings of the study in relation to current literature in addressing the three research questions. UDL provides a blueprint for educators to design a

flexible learning environment that reaches diverse learning needs and preferences. The challenge then becomes for online instructors to put UDL theory in practice. Specifically, how online instructors develop their teaching capacity to design and facilitate online learning based on UDL. The complexity process of UDL integration requires effective collaboration between and among stakeholders along with efficient resources to develop teaching capacity. Leadership is necessary throughout UDL incorporation from preparation stage to assessment stage, from creating clear vision to rewarding implementers. Multiple types of educational development opportunities should be offered to address individual needs.

CHAPTER SIX: RECOMMENDATIONS AND CONCLUSION

This chapter consists of four sections. It starts with a summary of the study to give a brief overview of the study design and findings. Then, implications for practice are discussed at multiple levels to foster UDL integration in online learning, followed by recommendations for future research. The chapter ends with a conclusion remark.

Summary of the Study

This exploratory case study investigated how instructors develop their teaching practice to implement UDL in the design and facilitation of an online graduate program, and examined the role of the academic institution, represented by academic leaders and educational development providers, in supporting teaching capacity and fostering UDL integration.

The nine participants involved in this study were from multiple levels within the institution (i.e., institution level, faculty level, and program level). They provided multiple perspectives of fostering UDL integration in online learning environment.

The main research question that guided the investigation was: How do instructors develop their capacity to design and facilitate online learning using UDL principles?

Data were collected from semi-structured interviews and document (e.g., course outlines, course shells, PPT presentations for conferences made by the participants, the program curriculum review, etc.).

Findings from the study revealed that successful UDL integration in online learning environment required four factors to be in place. First, effective leadership presence was a key in fostering UDL integration. Having a clear vision and strategic plans for UDL integration, being responsive to instructors needs, creating learning opportunities to develop teaching capacity, and

recognizing and rewarding teaching excellence were the main features of effective leadership presence in fostering UDL.

Second, sufficient resources and ongoing support to develop teaching capacity and foster UDL in online higher education were essential. Instructors need to be equipped with sufficient knowledge and adequate skills to effectively integrate UDL principles in the design and facilitation of online learning.

Third, the use of a CoP as an educational development approach facilitated the development of teaching capacity for UDL integration. Moreover, it positively impacted the instructors' sense of belonging and satisfaction. Regular meetings, trust, reflections, common interest, collaboration, ongoing peer feedback, and shared learning artifacts were the main features of the CoP.

Fourth, online pedagogy was thoughtfully considered along with UDL principles for an inclusive design and facilitation. Building a community for learners, establishing an effective instructor presence, and sharing teaching presence with students were the key features of online pedagogy.

Meaningful UDL implementation involved thoughtful considerations of what to do before, during, and after the process. Preparation phase was critical in setting the stage for UDL incorporation. Ongoing technological and pedagogical support was essential to work closely with instructors throughout the incorporation process. Using reflective practice aimed to identify strengths areas to be amplified and weaknesses areas to be eliminated to foster UDL incorporation.

The study is significant as it responded to the literature gap on UDL integration in online learning by exploring potential ways to build teaching capacity in higher education for design and facilitation of an accessible learning experience. Also, the developed framework, based on the findings from the study, contributed to the literature by synthesizing the fundamental elements: leadership, CoP, and knowledge and skills that need to be in place to foster UDL incorporation in an online learning environment.

Implications for Practice

From the research, the implications for practice in relation to fostering UDL integration in online learning need to be addressed at three levels: institution, faculty, and instructor. In the following sections, the implications are discussed per each of the three levels.

Implications for institution. Having a clear vision and strategic plan for UDL incorporation needs to be created and effectively communicated across faculties. To align with the plan, sufficient resources and supports are required with an adequate infrastructure to support the implementation. Multiple forms of educational development (e.g., workshops, intensive programs, technology coaching, educational consultation) along with available funding such as teaching grants could be offered to support faculties to increase their teaching capacity for the integration of UDL.

Research grants provide an evidence-formed process where there can be opportunities to study practice and to use data to inform practice. Further, it is important to highlight that educational development support should involve pedagogical and technological aspects of UDL in teaching and learning. Sufficient time needs to be given to understand UDL and then gradually apply its principles. In addition, incentives such as recognition and award systems can be used to

encourage faculty members learn new teaching approach and develop their practice (Scott & Scott, 2015). From the academic plan and vision down to the implementation in practice, this initiative needs to be adequately resources and with an array of supports in place to not only support the implementation but also its sustainability.

Implications for faculty. Customized support needs to be offered to help individual faculty members develop a deep understanding of UDL and its application for teaching and learning. Various strategies can be used to support enhancement of this work within a faculty. For example, informal conversations could be hosted to build networks, share practices, and increase awareness of UDL and learner variability. Within these conversations, concerns about UDL integration can be raised and solutions sought that work within a specific faculty context.

In addition, mentorship, one-on-one coaching, expert consultation, and a CoP could be used to assist instructors develop their capacity to design, develop, and facilitate teaching and learning grounded by the principles of UDL. Ongoing and differentiated support is required to address the needs of individuals within a faculty.

A critical factor is the leadership presence at the faculty level. Leaders need to create enabling conditions for educational development, as well as for instructors to come together to present their ideas, provide peer feedback, and showcase their work as a means of learning with and from each other.

As evident in my study, the effective leadership of the Academic Coordinator positively influenced the sessional instructors' sense of belonging and satisfaction. A CoP to lead the work of UDL was formed and maintained by an effective leadership presence. Collaboration, commitment, trust, regular meetings, effective communication, common interest, reflection, and

shared learning artifact were the main characteristics of their CoP. This sense of community influenced sessional instructors' sense of belonging to the institution, and thus increased their satisfaction. Having buy-in from individual instructors facilitates UDL integration. Further, with the institutional support, UDL integration becomes a wide-campus process (Bowman, 2016; Goforth-Melroy, 2014).

Implications for instructors. From an individual instructor's level, the integration of UDL needs to be an iterative process in which it expands gradually, and its effectiveness would be observed progressively. Sufficient time needs to be considered to not only learn about UDL but also to integrate its principles gradually. Through implementation, reflection helps to inform next steps, which is part of the gradual and hopefully graduated learning process that supports how UDL is integrated into practice. Considering the different levels of understanding and competence in using UDL, instructors would need to access an array of supports and educational development to enhance their learning and practice.

UDL is a general framework that guides instructors to select the tool and method that best meet its principles based on their own circumstance (e.g., learning objectives, student variability). UDL applications would vary from course to course, from instructor to instructor. However, identifying learning barriers to be removed is an essential step toward UDL. Providing multiple types of engagement, representation, and expression are the main principles of UDL.

Recommendation for Future Research

While my study aimed to contribute to the literature on UDL in a higher education context, additional research is recommended in the following three areas:

- 1) Increasing teaching capacity;

- 2) Institutional support; and
- 3) Student experience.

First, in my research the case study was delimited to a specific group of online instructors who designed and facilitate a graduate online program grounded on the principles of UDL along with their academic leaders and educational development providers who led and supported their development practice. The findings of the study reflected only the specifics of this case. To generalize the research findings, a larger study with a more varied sample of courses or programs (online, blended, face-to-face) from different disciplines is recommended.

In such a study, it would explore how instructors/faculty members develop their teaching capacity to design and facilitate their courses based on UDL. Potential research questions to guide this inquiry may include how faculty members develop their teaching capacity to integrate UDL into their teaching and learning approaches? What are the challenges or barriers that faculty members would encounter in terms of UDL integration? What types of resources and educational development opportunities are needed to foster UDL integration across disciplines in higher education? To inform the questions, data could be gathered from observations, documents, interviews, and surveys.

Second, another area for future research in UDL is institutional support. Lack of research has been conducted investigating the institution's role in fostering UDL integration in the higher education context. For example, how do higher education institutions foster UDL incorporation across faculties? What types of infrastructures and supports are required to be in place that results in greater impact on student learning? What are the barriers and how are they addressed regarding the implementation of UDL? A mixed methods study could be carried out using a

survey along with interviews to gather such information. This perspective would be examined from a provincial as well as a national perspective.

Third, it is important to investigate the student experience when UDL is implemented in a higher education context. A specific focus could be on student preparation for and perception of UDL-based learning environment. The following are possible research questions to guide the inquiry. What types of supports and preparation are required for students to engage well within UDL-based learning environments? How do UDL-based learning environments in higher education influence student motivation, engagement in learning, and satisfaction? One suggestion is conduct multiple case studies to learn about student experiences within various disciplinary contexts. Or, it may be informative to do a longitudinal study following a group of students over time to investigate how they engaged in learning within UDL-based environments in higher education.

While my research attempted to address a specific gap in the literature further research is needed. There is a need to better understand the design, implementation, and impact of UDL in higher education. UDL applications is still in its early stages in higher education, which creates a need for more empirical research to inform practice. Investigating the applications of UDL within learning environments (e.g., online, blended or/and face-to-face) is recommended in the higher education context.

Conclusion

The purpose of my study was to investigate the phenomenon of increasing online teaching capacity for UDL incorporation. Online learning is expanding rapidly to reach the demand of distance students who are willing to pursue their degrees in a flexible format. For

example, 14 percent of higher education students in the United States took all their courses online; 41 percent reside in different states other than the academic institution that they were attending (Allen et al., 2016).

Online students are varying in their backgrounds, cultures, locations, experiences, learning needs and preferences, therefore, UDL is needed. (Ostrowski et al., 2017; Rao, Edelen-Smith, & Wailehua, 2015). The challenge for educators becomes how to develop their teaching capacity to put UDL theory into practice (Ostrowski et al., 2017).

UDL integration is a complex process that requires effective communication and collaboration between and among people from multiple levels within a university. Such dynamic process results in supporting instructors to develop their teaching capacity through having sufficient infrastructure, offering a variety of educational development opportunities, providing customized technological support, and allowing access for funding. Having buy-in from individual instructors is necessary for UDL integration. Therefore, the preparation phase needs to be thoughtfully considered to gain that buy-in from instructors and ascertain needed resources. With institutional support, UDL integration is fostered and becomes a campus-wide process (Bowman, 2016; Goforth-Melroy, 2014).

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Appendix A: Interview Questions for Instructors

Online Learning Perception and Experience

Tell me about your experience in online teaching and learning?

What are the criteria for successful online learning, from your own perspective?

What key factors influence your online teaching success?

What kinds of resources and support are provided for online instructors to develop their teaching capacity within this university?

Universal Design for Learning Perception

What is your definition of UDL?

What are the benefits of using the UDL framework in online learning?

UDL Preparation

What resources have you used to develop your online teaching capacity to implement UDL in higher education?

Has the university (academic leaders, development providers) assisted/supported you in your development practice of UDL? Explain.

What structures and scaffolds are required to support UDL implementation in online learning?

Online UDL-Based Program

Tell me about the preparation, implementation, and outcomes of the UDL-based program with regard to the UDL incorporation.

How do you assess the program from the UDL perspective?

What types of improvement/ changes had been made from the first, and second iteration of the program?

Did you collaborate with other instructors and leaders in the program to increase your teaching capacity in UDL implementation? Explain.

What was the level of online students' engagement, satisfaction, and learning in such design?

What methods did students use to engage in, represent, and express learning in terms of UDL?

Does the role of online instructors change in a UDL environment?

Do the roles and/or expectations of online students changed in UDL environment.

What is the role of academic leaders, development providers in UDL implementation within online learning environment?

What criteria must be met to ensure successful online learning based on the UDL approach?

What issues or challenges did you face in designing or implementing the program?

Recommendation

Based on your experience, what did work well in the online program, what did not work?

What kind of support did you receive, and what kind of support you wished you received (e.g., institution level, program level, individual level)?

What recommendations do you have for the university and academic leaders to foster UDL implementation?

Wrap Up

Do you have anything else to add with regard to the design and implementation of UDL for the online program?

Appendix B: Interview Questions for Academic Leaders

Online Learning Perception

What criteria must be met for successful online learning?

What are key factors that influence online teaching and learning success?

What is the role of online instructors in successful online learning environment?

What is the role of online students in successful online learning environment?

What is the role of academic leaders in online learning success?

How do you measure online learning success?

What resources are provided/available for online instructors to develop their teaching practice?

UDL Experience

What is your definition of UDL?

What are the benefits of UDL implementation in HE?

What structures and scaffolds are required to support UDL implementation in online learning?

What are main challenges that may higher education institutions encounter in UDL implementation?

Online UDL-based Program

Tell me about the preparation, implementation, and outcomes of the online UDL- based program regarding the UDL incorporation.

How do you assess the program from the UDL perspective?

What support and resources were used to increase the online teaching capacity to use UDL?

What types of improvement/ changes had been made from the first, and second iteration of the program?

In comparison to other online programs, how did the UDL- based program influence learning outcomes?

What are the roles of academic leaders, professional development providers, and instructors in UDL implementation within online learning environment?

Recommendation

What recommendations do you have to enhance the program for future use?

Do you recommend other programs/institutions adopt the UDL approach in their online learning?

Why?

What recommendations do you have for other instructors, and academic leaders in terms of increasing online teaching capacity to foster UDL implementation?

Wrap Up

Do you have anything else to add regarding the design and implementation of UDL for the online program?

Appendix C: Interview Questions for Educational Development Providers

Online Learning Perception

What criteria must be met for successful online learning?

What key factors influence online teaching and learning success?

What is the role of online instructors in successful online learning environment?

What is the role of online students in successful online learning environment?

How do you measure online teaching and learning success?

What resources and support are provided for online instructors to develop their teaching capacity?

What types of methods could be used to increase online teaching capacity?

UDL Support

What is your definition of UDL?

What are the benefits of UDL implementation in HE?

What are key factors need to be in place to support UDL implementation in HE?

What resources are provided for instructors within your Educational Development Unit to support UDL implementation?

What structures and scaffolds are required to support UDL implementation in online learning?

Recommendation

What challenges did/may online instructors encounter in implementing UDL?

What recommendations do you have to enhance the current implementation of UDL within the university?

Do you recommend HE institutions adopt UDL approach in their online learning? Why?

What recommendation do you have to increase online teaching capacity to enhance the design and facilitation of online learning to meet diverse learning needs

Wrap Up

Do you have anything else to add with regard to the design and implementation of UDL in HE?