ATHABASCA UNIVERSITY

SHIFTING PARADIGMS:
A CRITICAL PRAGMATIC EVALUATION OF KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

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The future of learning.

Approval of Dissertation

The undersigned certify that they have read the dissertation entitled

SHIFTING PARADIGMS: A CRITICAL PRAGMATIC EVALUATION OF KEY FACTORS AFFECTING LEARNER-EMPOWERED TECHNOLOGY INTEGRATION

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Dedication

This dissertation is dedicated to my son, Adam,

who reminds me that it is those who are not indoctrinated by a discipline who make the greatest contributions to that discipline.

And to Stalan,

who was my loving companion and unwavering shadow

through these many years.

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Abstract

This dissertation used a critical pragmatic research paradigm, transformative mixed methods research methodology, and a paradigm shift framework to explore online graduate level students’ perceptions of what key government, institutional, curricular, instructional, and environmental factors and, ultimately, what educational paradigm most empowered them to integrate emergent technologies for learning on demand. Voluntary respondents came from two semester-long online graduate courses on educational technology that blended traditional and learner-centered policies, structures, and practices. The study employed in-depth interviews supplemented with online questionnaires to capture students’ perceptions before, during, and after their courses. One quarter of respondents expressed a consistent preference for one paradigm, while three quarters reported a paradigm shift from the beginning to the end of the term under study. Early term results indicated that nearly half of the respondents felt that a behavioural paradigm most empowered them to integrate emergent technologies for learning on demand. By the end of the term, over 90 percent perceived that a blended or learner-determined paradigm was most empowering. Furthermore, changes in respondents' pre- to post-term emergent technology integration level scores indicated that the most empowering paradigm was the perceptual paradigm. Throughout the term all respondents indicated that instructional, followed by environmental factors were most empowering. Nevertheless, those who preferred a learner-determined paradigm identified environmental factors more often; they also rated personal responsibility and self-motivation highly as well. Lastly, across all factor categories, three prevalent empowerment themes emerged: use of emergent technology was most cited, followed by relevancy, and then accessibility.

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List of Abbreviations and Nomenclature

	DEFINITION
accommodation	The adaptations that the pre-existing system of cognition undergoes to accept and include the information into its schema; the second phase of a knowledge acquisition theory by Piaget (1952)
active learning	Situations in which the learner actively engages or participates in the learning process
affective domain	Brain functions that include subjective thinking processes, such as attitudes, emotions, motivation; (Bloom et. al, 1956)
AI	Acronym for “Artificial Intelligence;” computer algorithms or programs that enable more complex digital processing functions analogous with higher order thinking skills in humans, such as pattern recognition and integration of different sources of information. Simple examples of AI include algorithms that track user preferences and then provide suggestions based on these preferences. AI is commonly used in robotics
andragogy	A term often associated with Knowles (1970), andragogy is a learning approach that typically focuses upon the needs and desires of adult learners, whom Knowles described as “self-directed” learners. Andragogy promotes the shared negotiation of some learning goals between instructor and learner, while fostering the learners’ reliance upon and participation in professional communities of practice
AR	Acronym for augmented reality; see “augmented reality”
assimilation	The integration of new information into the pre-existing system of symbols of knowledge in the brain; the first phase of a knowledge acquisition theory by Piaget (1952)
asynchronous learning	Learning that separates the learner from other learners and the instructor by time
AU	Acronym for Athabasca University
augmented reality	Or “AR,” the digital overlay of visual or audiovisual images onto real world objects
augmented reality technologies	Or “AR technologies,” digital technologies that enable the projection of images and/or sounds onto real world objects. Examples of AR technologies include mobile devices such as tablets and smart phones or wearables, such as AR glasses
axiology	In philosophy, a study of the nature of values and value judgments; in research, it involves researcher values and ethics and how they affect the research being conducted

	DEFINITION
behaviourism	An educational paradigm based upon the belief that the source of knowledge is the external, objective world. Learning occurs from sensory interaction with this world.
blended learning	The mixing of distance education (DE) and f-2-f learning experiences to achieve an educational goal
CMEC	Acronym for Council of Ministers of Education (for Canada)
cMOOC	Acronym for "connectivist massive open online course;" a term coined by Stephen Downes in 2012. cMOOCs are distinguished by their emphasis on interactivity and connection, facilitated by a departure from the traditional teacher-led lecture learning format to group learning through social networking media, activities, and learning communities
cognitive domain	Brain functions commonly associated with thought processes and knowledge; mental skills (Bloom et. al, 1956)
cognitivism	A learning theory adapted from psychology that focuses on the relationship between the senses and thought processes; aligns with the behavioural paradigm
conceptual framework	A map or guide that illustrates how different theories, concepts, assumptions, and beliefs are integrated together in a systemic manner
conceptual relativism	The belief that the world is always in the making, which therefore leads to the conclusion that truths and ideologies are relative to individuals and groups based upon their time and place-dependent perceptions and experiences; opposite of universal truth
connectivism	A term coined by Siemens (2005). Connectivism may be a new learning theory or paradigm. Connectivism views learning as an organic network with nodes of varying sizes. Knowledge is created, stored, and transmitted throughout the network and resides in non-human and human resources
constructivism	A learning theory that views the mind is an architectural structure; learning occurs by building and adapting this structure over time. Educators are best able to help learners by first understanding the learners' existing structure, and then providing interventions to adapt that structure to accommodate new learning
context	The sum total of all environmental, social, and/or other factors found in a particular place or situation; the setting
continuum	A progression with little perceptual difference between one segment and the segment before or after it, although the extreme ends are quite different. For example, on a continuum colour scale of grey, one increment of grey would appear not much different in colour than the increment before or after it. However, there is vast difference in colour between the white found at the beginning and the black at the end of this continuum

	DEFINITION
creative thinking	Thinking that moves beyond conventional logic, often combining previous ideas and processes in novel manners; thinking "outside the box"
critical thinking	Analytical and evaluative assessment of a phenomenon; a higher order thinking skills on Bloom's (1956) taxonomy
crowdsourcing	Obtaining ideas, innovations, input, information, or labour typically through the Internet from a wide group of paid or unpaid people to help solve a problem or complete a task
DE	Acronym for "distance education," a form of technology-enabled learning instruction in which the learner was separated from other learners and instructors by time and "space" (e.g., different physical locations). Recent advances in ICTs and educational practices are eroding the distances in time and space, though, challenging these original defining elements of the term
double-loop learning	A learning process that includes a period of deep thinking (i.e., involving contemplation about how new learning connects with or challenges existing values, beliefs, and knowledge), which may occur spontaneously; as defined by Argyris (1977) and Argyris and Schön (1978)
egalitarianism	A social or political philosophy based upon the belief that humans are fundamentally equal, or should have equal political, social, and economic rights and privileges
e-learning	An abbreviation for "electronic learning;" a recent extension of DE, involving digital technologies, media, and often ICTs for learning
emancipation	The act of freeing someone from the false ideologies and practices that force their submission and subjugation by dominant groups or individuals
emerging paradigm	A previously obscure or unknown school of thought and practice that is gaining popularity. Examples include 21st century learning and "connectivism" (Siemens, 2005)
emerging technologies	Recently invented technologies or existing technologies that are being used in innovative manners
epistemology	A branch of philosophy that considers notions of truth and knowledge (e.g., what is the nature of the relationship between the knower and what is known?)
f-2-f	An acronym for face-to-face; being in the physical presence of one another
false ideology	A system of beliefs and values that is intentionally fallacious or misleading. Marxist origin; used to describe how the social elite in capitalistic society uses goods, ideas, and institutional processes to mislead members of society, especially the proletariat masses, in order to maintain social power and profit economically

	DEFINITION
flexible learning	Learning environments that offer more choices to students than traditional, patriarchal learning environments do. Some choices include pace of learning, or selection between activities
formal learning	Learning delivered by educational institutional systems that are typically certified by governments or governing academic bodies; structured learning. Examples include public schools, universities, and tertiary schools
GPT	Acronym for "general purpose technology," which is a technology that has widespread or pervasive use across a society. Some examples include the steam and combustion engines, and electricity (Brynjolfsson & McAfee, 2014)
heutagogy	A term coined by Hase and Kenyon (2001), heutagogy is a learning approach based upon a perceptual learning paradigm. Adherents to heutagogy believe that only learners can control their own learning. As such, heutagogy promotes the development of lifelong, life wide learner-determined learning
humanism	A philosophy, doctrine, system, ethics, or way of life that focuses on individual and collective human values and beliefs, typically promoting a view of the goodness of humankind; focuses upon rational and empirical approaches to understanding, while rejecting dogma and superstition
ICT	Acronym for "information communication technologies;" technologies that enable information to be transmitted typically via telephony or Internet connections
IEP	Acronym for "individual educational plan." An IEP is developed during a meeting involving the learner and their learning team (e.g., parents, formal educators, other experts). A typical IEP meeting begins by establishing the "north star," or long-term goal (e.g., learner wants to become a doctor), and then working backwards from that goal to the present day. All plans are written with the learner's strengths, weaknesses, barriers, and incentives in mind. The most detailed part of the plan is usually the impending school year, which is broken down into terms and identified learning areas. Timelines and related resources (including individuals responsible for the delivery of these resources) are established. IEPs are typically reviewed and revised at the end of each school term. The ideal IEP is learner-determined; all other IEP team members are viewed as support resources
inclusive learning	Learning experiences or environments that include students who have been traditionally excluded from such learning; more egalitarian - learning contexts or opportunities
informal learning	Incidental learning; learning that occurs outside of formal or structured learning contexts or institutions; casual learning
instrumental reasoning	A term used by critical theorists to identify the form of reasoning that empiricists mean when using the phrase, *rational thinking*. Instrumental reasoning prizes objective fact, while rejecting values and intuition. From a

	DEFINITION
	critical theorist's point of view, the aim of such reasoning is to dominate and exploit the world
learner-centric	Learning that is focused on learner needs or goals; can be individualized; opposite to teacher-centric learning; can involve the use of a student portfolio, or Individualized Learning Plan (IEP); different than learner-directed or learner-determined learning in that the teacher may retain the locus of control in learner-centric learning
learner-determined learning	Learner is in control of the learning task, process, and learning context; also referred to as "self-determined learning;" term used by Hase and Kenyon (2001; 2013) in their learning theory, heutagogy. Learner-determined learning is not to be confused with "self-directed" learning, defined below
metacognition	Higher order thinking skills that enable one to analyze, evaluate, alter, or otherwise control one's cognitive processes; thinking about one's own thinking
m-learning	Abbreviation for "mobile learning," defined below
mobile learning	Used historically by Dewey (1916/2007) to describe learning in mobile societies, such as during the colonization of North America. Revival of the term in early 21st century tended to dwell on the portable digital devices and communication networks that enabled learning outside the physical confines of traditional brick-and-mortar schools. However, more recently the term has returned to Dewey's focus on the mobility of learners while learning, downplaying the importance of technologies that enable such learning; also defined as "anywhere, anytime, and just-in-time" learning.
MOOCs	Acronym for "massive open online courses," which are typically tuition-free, have open enrollment to anyone anywhere, have class sizes numbering in the hundreds to thousands of students, use digital, often OS technologies and resources and ICTs, and require Internet access to attend and participate in
natural learning	Non-structured, informal learning; learning that is not constrained by social rules, mores, or practices; characterized by the way children learn in early childhood – receptive to new ideas and experiences, curious, experimental, highly self-motivated
networks	Systems that connect agents, nodes, or individuals; two currently prevalent ICT networks are telephony and the World Wide Web, or Internet
neuroscience	The study of biological, chemical, and physiological functions of the brain
normative research	Subjective research; research that is value-based, that seeks to replace "what is" for "what ought to be," or "should be;" often resulting in prescriptions for improved quality of life for research subjects
OER	Acronym for "open educational resources;" educational resources that are freely available to the public for use; non-proprietary; not-for-profit resources.

	DEFINITION
	OERs are typically digital files found in a variety of media formats and often located digital repositories.
on demand	Supplied anywhere, anytime, as needed or desired
online learning	Technology-enabled asynchronous and/or synchronous learning, where the student is typically separated by time and distance from other learners and the instructor. However, recent advances in digital technologies, such as real-time virtual classrooms and remote AR are eroding parameters of time and place
ontology	In philosophy, theories about the form and nature of reality
omni-learning	"Always learning;" the ability to learn anywhere, anytime, on demand; emerging mobile, AR, and wearable technologies enable the possibility of such learning in today's world; a term that may not have been coined within the academic community yet
OS	Acronym for "open source," referring to computing source codes, as well as other software and resources that are shared freely with others; non-proprietary; not-for-profit resources
paradigm	Or "worldview;" a term that was initially used to identify particular scientific camps or schools of thought that subscribed to certain theories, values, beliefs, assumptions, methodologies, and instruments by Kuhn (1962), but has since been applied in other disciplines as well
paradigm shift	The change or movement from one worldview, or "paradigm," to another (Kuhn, 1962); a paradigm shift that significantly alters existing social, economic, political, cultural, educational, and other institutions of a particular society is often precipitated by the invention of a GPT (Brynjolfsson & McAfee, 2014)
pedagogy	Originating in Latin, the term literally means a man leading a boy in learning. Pedagogy is a teacher-directed approach to learning that adheres to a behavioural paradigm. This approach is most commonly used with children and novice learners
perception	The identification, interpretation, and organization of sensory information in the mind that is used to represent, understand, and interact with the environment
perceptual learning	Learning that involves the dynamic interplay of the environment and one's senses, cognitive thought, affective reasoning, emotions, and neuro-physiological functioning; the foundational tenet of a humanistic, learner-determined educational paradigm
perceptual paradigm	Those who adhere to this learning paradigm believe that the source of knowledge is innate and individually unique; see also "perceptual learning" above

	DEFINITION
PLE	Abbreviation for personal learning environment; the learner's holistic landscape and the technologies that the learner chooses for learning within that learning context
PLN	Abbreviation for personal learning network; the connections between the learner, other people, artifacts, the environment and the technologies that the learner chooses to enable learning within the network of connections
pragmatic	Focused on finding useful, or practical, solutions to problems within an existing context as opposed to pursuing ideal remedies for universal application
praxis	The operationalization of theory; theory realized in self-created practice (as originally defined by Marx; Jay, 1978)
rational thought	As defined by Kant (1781/2013) and adapted by Adorno (1951/2005), is a process in which the meaning attached to one's sensory perceptions of the world is challenged by some experience that is not compatible with this meaning. The incongruence is critically (i.e., morally and cognitively) reflected upon, and judgment is made by the mind before being acted upon
reflective thinking	Active examination of a form of knowledge, value, or belief in context of the evidence that supports or refutes it, and the conclusions reached from this examination; originally defined by Dewey (1910; 1933)
reflexivity	In research, the process of examining the researcher's own self, as well as the research relationship; involves critical examination and reflection on how the researcher's axiology affects decisions made in the research process, and how the researcher/research respondent relationship affects respondent's participation in the research project
schema	A mental model, map, diagram, or conceptual framework designed to organize, abbreviate, and make sense of complex, chaotic external phenomena
self-directed learning	The learner may be in control of learning context, but the teacher typically still controls the learning process and task; term is used in Knowles' (1970) theory of andragogy; also referred to as "learner-directed learning"; (not to be confused with "learner-determined learning," defined above)
shifting paradigms	The process of moving from one paradigmatic mindset or worldview to another. There are two paradigmatic views on the source of learning: behaviourism and perceptual learning. The behavioural epistemology asserts that the source of knowledge is external and sense-based, whereas the perceptual epistemology argues that the source of knowledge is innate human perception. Theories, approaches, and practices that manifest elements of both paradigms indicate a state shift between these paradigms. Therefore, for the purpose of this study, constructivism and andragogy indicate a shifting paradigmatic state

	DEFINITION
single-loop learning	Detecting and correcting an error, or solving a problem within an existing system or governing framework, without changing the system or governing framework; as defined by Argyris (1977), and Argyris and Schön (1978)
synchronous learning	Learning environments, situations, or contexts in which all participants can attend at the same time; “real time” learning
taxonomy	Classification of objects, concepts, etc., into an ordered system where those things grouped together share greatest similarities; also include underlying principles by which items were sorted and grouped
teacher-directed	Any curricular, instructional design, instructional delivery, activities, assessment, learning resources, and learning contexts selected or controlled by the instructor in a given learning environment
technology	Made up of two Greek words, *techne*, meaning art, craft, skill, or the means to obtain something, and *logos*, the outward expression of an inner thought or feeling; “tools, devices, systems, or procedures …[that] order and transform matter, energy, and information to realize certain valued ends” (Funk, 1999)
technology integration	In education, the seamless inclusion of technologies in learning experiences or environments, whereby the use of a given technology comes naturally to the learner in support of their learning, rather than being the focus of their learning; also defined as a process of growing accustomed to using a technology for learning
traditional learning	Formal learning theories, contexts, and practices typical of Industrial Age educational system based on an empiricist, behavioural educational paradigm; characterized by brick-and-mortar buildings with f-2-f teaching/learning interaction, patriarchal management, independent seat work, rote learning, and strict rules and routines
transformation	Dramatic change in form, function, and/or appearance; metamorphosis
universal truth	A fact that is accepted as overwhelmingly accurate by most people in a given society for being a valid statement of what is (e.g., the earth is round); opposite of conceptual relativism
virtual classrooms	Also known as “v-classes;” online, or Internet-connected rooms that exist in virtual, rather than physical reality; typically allow users to attend, as well as interact with each other through a variety of synchronous and asynchronous ICTs
wearables	Digital technologies that can be worn; e.g., AR eye glasses and computerized watches

Chapter I: INTRODUCTION

The central thesis of this research project is that as humans advance technology, technology alters humanity. At present, the rapid, unpredictable, and dynamic emergence of new technologies not only requires perpetual openness to new learning, but also a mindset that fosters endless critical, rational, and creative thinking. It is not enough to acquire instrumental reasoning; as humans, we must also empower ourselves to think deeply, challenge our beliefs, values, and motivations, imagine and test new ideas, and move beyond the status quo in the tireless pursuit of increasing global emancipation and egalitarianism.

This research project is based upon the hypothesis that humankind is on the brink of a major shift in how we, as humans, view ourselves as learners; a shift that is made possible by the increasing prevalence of emerging educational technologies. Yet, while these technologies may currently offer the opportunity to create equitable education for all humankind, there is growing evidence that the few who presently control social orders are also finding new ways to use the same technologies to increase existing control (Center for Democracy & Technology, 2013).

It is also possible that learners may not appreciate or capitalize upon the -equitable potential of emerging educational technologies. In light of this possibility, the goal of this research was to define what educational context best empowers online learners to integrate unpredictable, perpetually-emerging technologies as needed for learning. A research study that rests upon the theoretical foundation of critical pragmatism and a transformative mixed methods methodology was used to help determine if these learners' perceptions and experiences with such technologies coincide with a shift from the traditional, teacher-driven view on learning to a new perceptual, learner-determined perspective.

Further theoretical, conceptual, substantive, and practical elements for this dissertation are elaborated upon in the seven chapters included herein. Chapter 1 provides an introduction to the overall project. The second chapter reviews the theory, nature, and power of learning from a critical pragmatic perspective and concludes with the egalitarian promise that distance education (DE) offers for learners. Chapter 3 delves more deeply into the subject of DE and the role that educational technology plays in such learning. Various technology integration frameworks, models, and taxonomies are then critically reviewed before the paradigm shift and omni-tech taxonomy created for this study are introduced. Chapter 4 details how the theoretical, conceptual, and substantive elements reviewed in the preceding chapters were translated into a practical research project designed to answer the questions poised, and thus address the problem at hand. Chapter 5 presents the quantitative and qualitative data results of the study, which are then discussed in Chapter 6. Lastly, conclusions about the study, the implications of the findings for online learning, and future research directions are presented in Chapter 7.

To begin the dialogue, this first chapter opens with a broad overview of how technology influences our lives and our interactions with the world before exploring the current online DE context wherein the identified dilemma and purpose for this research endeavour are found. The theoretical foundation of the project is presented next, along with discussion on how this theory was practically applied to the project. The significance of the study is then established before an overview of the structure for the project closes the chapter discussion. To set the stage for the central thesis, the chapter opens with a definition for the term, technology, and a historical review of the human/technology interface.

How Technology Changes Humanity: A Historical Perspective

This section begins by defining the word, *technology*, as applied within the context of this study. Technology is derived from two Greek words: *techne*, meaning art, craft, skill, or the means to obtain something, and *logos*, the outward expression of an inner thought or feeling (Funk, 1999). Yet despite the seeming clarity of the notions behind these root words, it appears that few scholars agree on what the term, technology, actually means. To illustrate, in his blog posting on the term, senior research fellow at the Mercatus Center at George Mason University, Adam Thierer (2014), offers 16 unique definitions from noteworthy dictionary and technical expert sources. Thierer posits that this list is not exhaustive, nor is it representative of ultimate authority on what the term means. A review of these definitions, as well as other academic literature suggests that many scholars incorporate concepts associated with certain elements of the first Greek root word, techne, but fail to recognize the connotations associated with the second root word, logos. For example, Palalas and Hoven (2016) frequently refer to mobile technology as “tools,” while identifying the craft, skills, and systems associated with these tools as separate from the word, technology. Furthermore, they completely divorce the concepts of human values and motivations from human invention, use, adaptation, or rejection of these tools. Thus, Palalas and Hoven’s (2016) application of the term seems to reflect a utilitarian perspective of technology shared by many scholars. In short, such scholars seem to identify the term, technology, with the use of a tool that satisfies some practical end for humans.

Critical theorist Kaplan (2003), however, considers technologies to be not just utilitarian tools, but entire systems. From Kaplan’s perspective:

> Technologies are best seen as systems that combine technique and activities with implements and artifacts, within a social context of organization in which the technologies are developed, employed, and administered. They alter patterns of human activity and institutions by making worlds that shape our culture and our environment. If technology consists of not only tools, implements, and artifacts, but also whole networks of social relations that structure, limit, and enable social life, then we can say that a circle exists between humanity and technology, each shaping and affecting the other. Technologies are fashioned to reflect and extend human

> interests, activities, and social arrangements, which are, in turn, conditioned, structured, and transformed by technological systems (pp. 167-168).

To others, such as Sacasas (2014), Kaplan's definition is not only "bloated," but is indicative of the technical complexity of modern society and humanity's growing awareness of the significance of human invention.

Funk (1999) offers a succinct definition for technology that encapsulates meanings associated with both Greek root words. From his perspective, technologies are "tools, devices, systems, procedures … [that] order and transform matter, energy, and information to realize certain valued ends" (Funk, 1999). It is this concise definition offered by Funk that is subscribed to in this dissertation. In other words, for the purpose of this study, technologies are viewed as "tools, means, skills, crafts, or systems that are outward reflections of individual and societal values and motivations."

These three latter definitions support the concept that technology actively transforms the world according to human beings' internal value systems *and* changes humanity in the process. Pivotal moments in history are often identified by the technologies that redefine human lives: consider the Stone, Bronze, and Iron Ages, each of which mark new eras in human existence. Other commonly known precursors to profound economic and social revolution include the stirrup, the plow, the steam and combustion engines, information communication technologies (ICTs; Brynjolfsson & McAfee, 2014; Rose, 2013), and even the atomic bomb. Exponential growth in the emergence of new technologies continues to revolutionize society and thus impact the field of education by prompting new economies and *paradigms* (that is, *worldviews*, or schools of thought that subscribe to certain metaphysical assumptions, theories, values, and instruments; Bird, 2013; Hawkins, 1983/2002; Kurzweil, 2005; Moore, 1965/1998, 1975). It is this relationship between emerging technologies, economies, and educational paradigms that forms the backdrop for the study and to which attention now turns.

Emerging Technologies, Economies, and Educational Paradigms

Exponential growth in number and variety of emergent technologies is evident in the field of education (Bates, 2005). These *emerging technologies*, defined for the purpose of this study as "tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33), are changing the socio-economic face of education. Brick-and-mortar post-secondary institutions, traditionally populated with young, higher class adults, are giving way to virtual classrooms filled with global citizens of all ages and backgrounds. This accelerating transition to a more inclusive, flexible education model is, in turn, challenging traditional beliefs about not only the role of formal education, but also the very nature of learning (Hase & Kenyon, 2013). It appears that humanity is on the cusp of a new educational paradigm.

A concern is how best to support learners as they integrate emerging technologies for learning *on demand* (or in other words, when, where, and how learners want) during a time when the traditional teacher-directed paradigm may be failing them. It is against this critical backdrop that a problem is identified and the following dissertation is undertaken.

The Problem

While there is evidence of increasing "mobilization" of learning (Ally, 2009; Traxler, 2009), some literature claims that many higher education institutes are not theoretically or practically prepared to deliver "comprehensive, sustainable, meaningful, and compulsory" mobile learning curricula that equip graduates for accessing, using, and learning from mobile resources in the workplace environment (Fuller & Joynes, 2014; see also Croop, 2008; Dede, 2007, 2009). Pointing out that the emergence of new learning technologies outpace educators' understanding of relevant competencies, Cleveland-Innes and Campbell (2012) concur, surmising that, "learners are left to create their own understanding and develop the [cognitive and affective] skills to succeed in

[the] technologically mediated [higher education] environment" (p. 283; see also Greener & Wakefield, 2015). Veletsianos (2010) concludes that the use of emerging technologies for learning "may necessitate the development of different theories, pedagogies, and approaches to teaching, learning, assessment, and organization" (p. 18).

Most emerging technologies used in education are adopted from other fields, so integration into the field of education often requires the co-evolution of these technologies and teaching practices (Gros, 2016). This state of flux between dynamically evolving emerging technologies and educational practices requires learners to adopt a mindset that enables them to cope with perpetual ambiguity, while thoughtfully and purposely integrating needed emerging technologies on an ongoing basis. It appears, then, that integration of emerging technologies into the learning environment requires more than a mere tweaking of curriculum or instructional processes. Rather, it implies a fresh look at the very nature of learning, which may demand a total *shift* (or a profound change in perspective; Kuhn, 1962) from the traditional educational mindset of teachers and learners to a profoundly different, perhaps more learner-driven paradigm (Emery, 1981; Hase & Kenyon, 2001, 2013; Hoven & Palalas, 2016; Palalas & Hoven, 2016).

In order to provide fresh insight into the problem at hand, this research project seeks to reflect the learners' learning experience*, through their voices,* using a critical pragmatic lens and transformative mixed methods research methodology. The central question asked in this study is, "*What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?"*

According to scholars such as Kuhn (1962), and Brynjolfsson and McAfee (2014), the change, movement, or *shift* from one worldview, or paradigm to another significantly alters existing social, economic, political, cultural, educational, and other institutions of a society due to the transformation of shared beliefs, theories, and practices generated from this profound shift in perspective. Brynjolfsson and McAfee (2014) contend that such paradigm shifts are usually precipitated by the widespread or pervasive use of a new general purpose technology (GPT, such as the steam engine, or electricity). The burgeoning use of wireless communication network systems (ITU Telecommunications Development Bureau, 2015) and the related exponential growth in emergent technologies in the field of education (Bates, 2005) may currently be prompting a paradigm shift not only across the field of education, but also among online graduate level learners.

Given this premise, a paradigm shift model is introduced in this study to help assess what educational paradigm students prefer before, during, and after their participation in formal online courses that merge traditional and learner-determined practices. The relationship between the identified paradigms and a new, omni-tech taxonomy is also explored to ascertain student perceptions of what level of emergent technological integration they possess within each phase of the paradigm shift framework. Figure 1, located in the Conceptual Framework subsection of this chapter, provides an integrated graphic view of the model and taxonomy and how they relate to the other elements of the study. The model, taxonomy, and resultant paradigm shift framework are then discussed at length in Chapter 3, after the context from whence they are derived has been more fully established.

Thus far, the introduction to the project has identified the problem at hand, offered the overarching research question meant to address this problem, and introduced a model and taxonomy that are designed to investigate this issue. The dialogue now moves on to the purpose and related objectives of this project.

The Purpose

The purpose of this study was to determine what key institutional, curricular, instructional, and contextual factors, and ultimately, what learning paradigm the online graduate learners in this study believed most empowers other learners and them to integrate emerging technologies for learning on demand.

In fulfilling this purpose, four objectives were identified. First, by using a critical pragmatic research paradigm (Ulrich, 2007a) and a transformative mixed methods methodology to capture and explore the situation from the learners' point of view, new theoretical and practical insights relating to this problem might be discovered and shared. Second, the paradigm shift model might help learners and educators to plan and evaluate learning experiences using practices and models that are consistent with a selected educational paradigm and its related learning theories. Closely associated to this second objective was the potential contribution of a learner-determined technology integration taxonomy. This omni-tech taxonomy might help learners and educators to identify levels of technology integration and plan for continued growth within the learners' unique contexts. The final objective was to redefine learning as a dynamic interrelationship between inner cognitive, affective, and neurological processes, external natural and social environments, and the technologies that help to alter these worlds. In doing so, it is hoped that a deeper appreciation of how technology reflects and transforms humanity will foster academic dialogue on the urgent need to nurture learners' rational and creative thinking in the pursuit of greater global equality.

The recurring value-laden themes of empowerment, transformation, and equality embedded in the project are part of a worldview that permeates every aspect of this study. It is therefore judicious to overtly express this worldview now, so that the rest of the project is understood as being derived from this perspective.

Theoretical Foundations

This study is founded on the belief that *all* research is theory and value-laden (Kuhn, 1962; Putman, 1990; Reiss & Sprenger, 2016). Every element of the research process is affected by researcher bias. Therefore, this study strives to openly identify this researcher's personal biases in the study, thus enabling others to not only see the project through this researcher's lens, but to also assess the application of this perspective from their own and other worldviews (Cohen, Manion, & Morrison, 2011; Pannucci & Wilkins, 2010; Pontellotto, 2005). The aim of this approach is to prompt dialogue on how collective views might enrich, extend, and possibly transform research beyond this initial project. (As part of this aim, the researcher's reflective journal is available upon request).

This researcher's perspective aligns with a critical pragmatic paradigm. Due to its obscurity (Ulrich, 2007a) and the fundamental role that this research paradigm plays in the presentation and execution of the entire dissertation, a review of the origins, definition, tenets, and practical applications of critical pragmatism now ensues. It is hoped that by providing this review now, readers will be better able to identify the elements and applications of this research paradigm throughout the rest of this project.

The critical pragmatic paradigm.

This review of critical pragmatism begins by explaining how the somewhat incompatible research paradigms of critical theory and pragmatism merge into a critical pragmatic worldview that not only endorses the strengths of the both, but mitigates their inherent weaknesses as well. Significant points of convergence and divergence between critical theory and pragmatism are presented before salient theoretical and conceptual notions of critical pragmatism are identified. The sub-section concludes with justifications for selecting the critical pragmatic paradigm chosen for this project.

Critical theory and pragmatism: Points of convergence and divergence.

It is of little surprise to find congruencies between critical theory and pragmatism, for the latter evolves from analytical Anglo-American liberalism and Continental critical theory (Frega, 2014). This may help explain why, for example, contemporary writers are able to trace some of Dewey's ideas to Hegelian notions (Frega, 2014; Midtgarden, 2012), re-discover the critical elements of Dewey's pragmatics (Kadlec, 2006), and recognize his influence in Freire's (1970/1993) writings (Kellner, n.d.). It may also shed light on why McDermit (n.d.) identifies Habermas as a neo-pragmatist. While it is well-known that Habermas originates from the Frankfurt School (Bohman & Rehg, 2014; Friesen, 2008; Held, 1980; Mezirow, 1981), many scholars, including Habermas, acknowledge his theoretical affinities to pragmatism (Shalin, 1992; Young, 1997). Analysis of such scholars' works reveals a number of shared covenants.

In synthesis, critical theory and pragmatism are committed to: (a) the notion of a socially-conceived reality; (b) the rejection of universal truths and the exposure of false ideologies; (c) an integration of philosophy and social sciences that enables normative analysis, explanation, and forecast; (d) use of empirical, not conceptual analysis, in developing normative theory; (e) research that is situated within social, historical, political, and other contexts; (f) the importance of developing rational thought and reflection; (g) the transformative power of individuals, groups, and social institutions to evoke egalitarianism; and (h) the educational means needed to realize emancipation and equality (Bergstrom, 2000; Cohen et al., 2011; Creswell, 2003; Frega, 2014; Lather, 2006; Midtgarden, 2012; Perry, 1929).

Nevertheless, pragmatism also contrasts with critical theory on various points. Pragmatism differs in that it: (a) values pluralistic understandings of normative practices over critique; (b) analyzes and critiques liberalism and capitalism contextually, rather than rejecting them; (c) discards any general diagnosis of pervasive forms of social pathology; (d) views politics as only one of many social institutions, rather than ruminating on it; and (e) prefers to solve imminent problems practically within existing situations, instead of sparking revolutionary action (Bourne, 1917; Dewey, 1916/2007; Frega, 2014; Freire, 1970/1993; Kellner, n.d.).

It is difficult, however, to draw definitive lines of agreement or disagreement within or between the critical theory and pragmatic camps, largely due to their historic relations, their singular goal of equality garnered through shared and disparate means, the contemporary deconstruction of classic works, and the scholarly re-interpretation of the world through the neo-critical and neo-pragmatic lenses of today. One area of significant agreement, yet not without divergent approaches, is reflective thought. An in-depth review on reflection, critical reflection, and reflexivity is reserved for the third chapter. However, the current comparative analysis on critical theory and pragmatism would be remiss without a brief introduction on how each camp interprets the general notion of reflective thought.

Reflective thought.

The collective conception of reflection by critical theorists and pragmatists (Bohman, 2015; Dewey, 1910/2011; Mezirow, 1981) is derived from Kant's (1784/1997, 1803/1904) definition of *critical rationality* (Shalin, 1992). Kant posits that one must first uncover personal prejudices and limitations through self-reflection and then "engage the courage and resolution to use (this enlightened understanding) without direction from others" (Kant, 1784/1997, 1803/1904). Only by doing this can one hope to escape dogmatic thinking (Hegel, 1807/2014) and realize emancipation (Kant, 1784/1997).

Where critical theorists and pragmatists differ is on how rational thought catalyzes change. Critical theorists emphasize the interplay between intrapersonal psychological, moral, and cognitive functions, and interpersonal rational discourse (Herd, 1980; Shalin, 1992; Ulrich, 2007b), while pragmatists dwell on the interrelationships between problem-identification, cognition, and comprehensively examined consequences (Dewey, 1910/2011; Urlich, 2007b). As a result, the pragmatic position is criticized for its lack of interactive, discursive, emotional, and ethical elements of reflection (Cinnamond & Zimpher, 1990; Rorty, 1987; Zack, 2008), and critical theorists, especially Habermas, are faulted for ignoring the non-verbal cognitive and experiential aspects of the reflective process (Shalin, 1992; Zack, 2008). Ironically, while critical theorists are thus held to task for devaluing experience and pragmatists are chastised for exaggerating it, both are criticized for adopting a reflective process that has failed to achieve emancipatory praxis (Bourne, 1917; Cohen et al., 2011; Jay, 1973; Shalin, 1992).

Fortunately, the emerging paradigm of critical pragmatism offers some hopeful solutions, not only for addressing the dilemma of reflective thought, but for many of the aforementioned conundrums that critical theory and pragmatism face. Broadly speaking, these recourses include pragmatizing reason for critical theory, operationalizing holism in pragmatic thought, and developing critical heuristics "of rationality, truth, and ethics" (Ulrich, 2007b) for reflective practice. Thus, by merging critical theory and pragmatism, critical pragmatism not only significantly mitigates their weaknesses, but capitalizes on their strengths as well. These are some key reasons for choosing critical pragmatism for this study.

Critical pragmatism.

Critical pragmatism is "a theory of science that emphasizes the need to apply knowledge to everyday problems based on radical interpretations of liberal and progressive values" (Deegan, 1988, p. 26). Although Deegan (1988) coined and defined the term, critical pragmatism, she credits it as a worldview initially articulated theoretically and experientially in the 1890 - 1930 writings and lectures of Jane Addams (Deegan, 1988; Mahowald, 1997; Ulrich, 2007a, 2007c). In her 1988 book, *Jane Addams and the Men of Chicago School 1892-1912,* Deegan chronicles the American political forces of the First World War era that drove Addam's work into academic obscurity, which explains why some of Addam's male colleagues, most notably John Dewey, are now frequently credited as the founders of critical pragmatism (Deegan, 1988; Mahowald, 1997; Ulrich, 2007a; see also Kadlec, 2006).

Experiencing a world that is always in the making, critical pragmatists endorse the idea of "conceptual relativity" (Putman, 2004). In other words, knowledge is relative, situated, and formed by multiple perspectives and goals. Since reality is often socially constructed, it can be manipulated by the powerful at the expense of the weak (Vannini, 2008). Critical pragmatists embrace the emancipatory, transformative potential of social theory, pragmatism, and research, while striving to be reflective, ethical, polemical, and activist citizen scholars (Ulrich, 2007a; Vannini, 2008). Thus, critical pragmatists merge reflective practice, critical theory, and pragmatic research traditions (Ulrich, 2007b) to analyze and change contexts, outcomes, rationality, power, and ethics (Zack, 2008) and, in doing so, promote egalitarianism. The challenge, as with critical theory and pragmatism, is to translate theory into practice; a challenge that is compounded by the youth and obscurity of critical pragmatism (Ulrich, 2007a).

Critique of critical pragmatism.

Only a modicum of theoretical, substantive, and research literature exists on critical pragmatism. Most available publications relate to public policy planning theory (Forester, 1993; Ulrich, 2007a; Zack, 2008) or communication theory (Korta & Perry, 2011). The paucity of educational research literature, especially the absence of research in online and mobile learning (Friesen, 2008), offers a tumultuous pioneering opportunity for this study that could serve to excite, confuse, or deter potential participants and intended audiences, depending a fair degree upon how clearly, accurately, and successfully critical pragmatism is deployed herein.

Cautionary examples of how difficult the critical pragmatic process is to implement arise from the field of planning theory (Sager, 2006). To elaborate, the aim of multi-stakeholder planning is to enable equitable decision-making generated by the force of best arguments, not power. This requires planners who can unmask false ideologies, wrestle power from dominant stakeholders, encourage unfettered participation by the underprivileged, and foster an unconstrained dialogue leading to a transparent, equitable decision-making process. Ensuring inclusiveness, equal participation, and orientation towards mutual understanding can be untenable challenges for planners who lack the skill or resources to ensure equitable decision-making (Baxamusa, 2008; Forester, 1999; Sager, 2006).

Readers may wonder why a critical pragmatic paradigm was chosen for the project after considering the intense implementation challenge of critical pragmatic planning processes, as well as the apparent failure of educational research initiatives to realize emancipatory aims through critical theorists' theoretical and pragmatists' practical agendas. A few rationales are offered in response.

Justification for choosing a critical pragmatic paradigm.

As previously stated, critical pragmatism accentuates the strengths of critical theory and pragmatism, while mitigating their weaknesses. Secondly, it seemed prudent to work within the researcher's own paradigm for a dissertation project. Two other salient reasons are also offered.

Equitable education and the emancipatory power of technologies are two fundamental tenets of critical pragmatism (Cohen et al., 2011; Creswell, 2003; Zack, 2008). Distance education (DE) greatly expands the limited formal learning opportunities offered to people who live in remote locations, or who may otherwise be denied access to such education. Therefore, as a critical pragmatist living and learning in geographic isolation, this researcher extols and promotes a central tenet of DE, "education for all" (Wedemeyer, 1971).

Lastly, the theoretical, conceptual, and personal justifications presented here and elsewhere in this study are primary catalysts for choosing to explore fellow students' technology integration processes from *their* perspectives. The driving force for this study is a singular question; "What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?" The first step was to focus on the learners' perceptions: listen to their voices, document their fears and motivations, and analyze perceived incentives and barriers to this learning goal within the real contexts of their lives. The next step was to put forth processes and products that might empower and transform learners, extending and expanding "education for all." By doing this, critical pragmatic research theory is translated into practice.

Theory into Practice

Key tenets of critical pragmatism identified by this researcher, which frame the theoretical, conceptual, methodological, and practical constructs of the dissertation, include:

- Holism (for example, transdisciplinary studies; cognitive, affective, physiological, and psychosocial dimensions of rational and creative thought),
- Plurality of contexts,
- Lifelong, life-wide learning,
- Learner-empowerment and emancipation,
- Transformative learning (founded on rational and creative thought, and reflective action),
- Interactive learning,
- Mobility (defined by Dewey as "mobile society learner attributes," 1916/2007, p. 103),
- Power relations among educational institutes, employers, learners, and other key stakeholders,
- Equality; especially the DE tenet, "education for all" (Wedemeyer, 1971),
- Reflexive research practice, and
- Research that oscillates between theory and practice, values process and product, and seeks to transform humanity into a more egalitarian society.

These principles and axioms bind philosophy with praxis and, as such, are the impetus of certain theoretical assumptions by this researcher, upon which the project rests.

Theoretical assumptions.

Two critical assertions put forth in the study are that: (1) universities *should* produce 21st century graduates who are able to perpetually, rationally, and creatively integrate needed emerging technologies on demand, and (2) learner perceptions about their emergent technology integration needs and goals *should* influence the development of emergent technology integration curricula, instruction, and contexts in higher education institutions.

Underlying these assumptions is the belief that emergent technologies *are* enabling increased learner empowerment. The exponentially-increasing ubiquity of these technologies and information flow may be prompting the shift from a formal teacher-directed to learner-determined educational paradigm. However, learners and those who seek to empower them must act swiftly, before dominating powers discover new ways to enslave the masses through exploitation of these very technologies.

Nonetheless, pragmatically-speaking, before any educational recommendations may be made based upon the above assumptions, the first step is to understand *what*, *how,* and *why* emerging technologies are currently being used in learners' online and other learning contexts, what educational paradigms learners prefer, and how these are related. Blending these critical and pragmatic positions, the study sought to reflect the learners' perceptions about what key factors and learning paradigm best enable them to integration emerging technologies on demand within their personal and collective learning contexts by answering the following questions.

Research questions.

In short, the study asks, "What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?" More specifically:

1. What are the key institutional, curricular, instructional, and other contextual factors that empower the learners in this study to integrate emergent technologies for learning on demand? Will these perceptions change as they progress through the course?
2. Is there a difference in technology integration levels between the learners in the study who identify a preference for a traditional teacher-directed learning paradigm or a learner-determined one, or who appear to be in the midst of a paradigm shift? If so, what key learner-identified factors are most likely associated with the reported differences?
3. Is there a difference in the amount of scaffolding and learning curve reported by the learners in the study who identify a preference for a traditional teacher-directed learning paradigm or a learner-determined one, or who appear to be in the midst of a paradigm shift? If so, what key learner-identified factors are most likely associated to the reported differences?

The following *conceptual framework* (or "system of concepts, assumptions, expectations, beliefs and theories;" Maxwell, 2005, p. 33) offers a roadmap, meant to guide the research process along a cohesive, consistent path to the answers for these questions.

Conceptual framework.

The conceptual framework presented in Figure 1 depicts how key theoretical, conceptual, and substantive elements were integrated into a plan aimed at achieving the purposes of this study (Cohen et al., 2011). Researcher beliefs and values about technology, learning, and the role of education were reflected in, and reinforced by the critical pragmatic research paradigm chosen for the study. These factors fueled contemplation about whether or not learners require a new, learner-determined educational paradigm in order to more fully integrate emerging technologies for learning on demand. A review of literature offered historical, conceptual, and structural insights about learning, education, and the role of technology in learning. This review uncovered learning theories, frameworks, and technology integration taxonomies that required deeper critical pragmatic exploration. Synthesis, reflection, and evaluation of theoretical, conceptual, and substantive components led to the creation of a new paradigm shift framework that merged a paradigm shift model and omni-tech technology integration taxonomy, and was designed to determine the necessity of a learner-determined paradigm for emergent technology integration.

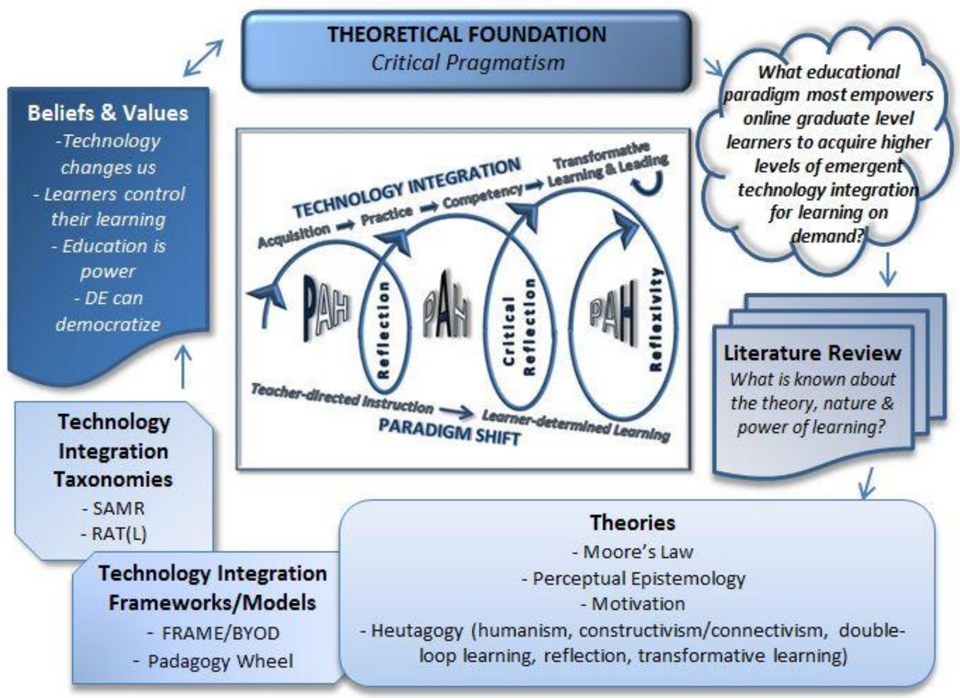


Figure 1. Conceptual framework for determining what learning paradigm best enables online graduate level students to achieve higher levels of emergent technology integration. The directional arrows indicate that the development of the paradigm shift framework began by identifying a research paradigm that closely aligned with the researcher's beliefs and values, and moved forward from there.

Having now identified the problem at hand and introduced a plan for addressing this issue, it is time to establish why the results of the study may offer value to others. Thus the following section is devoted to a discussion on the significance of this study.

Significance of the Study

Although limited in scope, and therefore difficult to generalize findings beyond the online graduate students in this research study, it may appeal to a broad audience, offering governments, policy-makers, funders, educational institutional leaders, instructional designers, and faculty a fresh perspective on the roles that education and technology play in learning. For example, this study challenges stakeholders to accept and build upon the belief *that only learners control their own learning*. This is done by using a research paradigm that identified issues of power and control in education and revisiting conceptions about learning from the perspectives of those who are supposed to benefit the most from education, that is, *the learners*. The contribution of a paradigm shift framework that marks learner placement between teacher-directed and learner-determined educational paradigms is intended to amplify the relationship between learner empowerment and emergent technology integration for learning on demand. It is hoped that through these means, the urgent need for new dialogues on learner empowerment and perpetual emergent technology integration for learning on demand is realized.

An extension of the contribution above is the continued promotion of the central DE tenet of "education for all." This is done by exposing disenfranchising power structures while highlighting the innovative, omnipresent potential of learning facilitated through emergent technologies.

Lastly, there is a paucity of literature on critical pragmatism, in part due to the recent coinage of the term (Deegan, 1988; Ulrich, 2007a, 2007b). Only a handful of social science research publications exist, mostly from the discipline of planning theory. No works using this research paradigm have been uncovered to date in the areas of DE, online learning, emerging educational paradigms, technology in education, or emerging educational technology. This project may well be the first example of academic research in this topic area that uses a critical pragmatic paradigm. Thus, the research project offers a valuable contribution by exemplifying philosophical, conceptual, and methodological constructs of critical pragmatism, and demonstrating its practical application within this research setting. Moreover, the project presents researchers with a new framework, model, and taxonomy to test, and further research to conduct on areas left unexamined. Yet, due to the fact that this is a pioneering effort undertaken by a novice researcher, it is imperative that the paths selected have been clearly marked so that others may critically analyse each step taken. (As part of this ongoing effort, the literature selection process used for the project is included in the researcher's reflective journal).

It is with these final thoughts on the significance of the study that the introduction to the project draws to a close. A summary of what has been discussed thus far follows next. The chapter then concludes with a brief overview for the structure of the dissertation project.

Summary

The primary aim of this chapter is to present the problem under study, along with a broad overview of the research project addressing this critical issue. In short, it appears that current formal education systems may be ill-equipped to prepare students to learn and work with unpredictable, exponentially ubiquitous emerging technologies in a rapidly changing world. This is prompting fear about the loss of control, if not the possible demise, of formal educational institutions and the existing socioeconomic and political structures that govern them, as emerging technologies increasingly empower learners to access, create, store, and share knowledge on demand beyond the confines of the sterile, four-walled classroom setting. It is also sparking new dialogues about the nature and ownership of learning and conceptions of an emerging learner-determined paradigm.

The project defines what learning paradigm online graduate level learners perceive to best support their perpetual integration of emerging technologies for learning on demand. Believing that the use of a traditional research paradigm and study approach that involves data collection from other stakeholders would likely yield results that reinforce the status quo, a critical pragmatic paradigm was chosen to help guide the collection, synthesis, analysis, and reporting of data that *only reflect the learners' voices*. By purposely amplifying learners' perspectives through the project and subsequent publications, stakeholders' and readers' habituated thinking about the nature, power, and process of learning and the role that emergent technologies play in the learning equation may be disrupted, challenged, and perhaps transformed. It is this review of the theory, power, and nature of learning that seeks to build a convincing case for challenging traditional conceptions of learning in the next chapter.

Overview for the Structure of the Dissertation Project

As outlined in Table 1, this project followed six stages, beginning with the development and pilot testing of the paradigm shift framework and the research instruments used to operationalize this framework. This pilot test was done for quality assurance purposes.

Once revisions were made, the second stage was initiated by introducing the target sample population to the project and obtaining respondent permission to participate in the study. Then the collection and initial analysis of primarily quantitative data from the online pre-course questionnaire began. Four to six weeks through the four-month academic term, qualitative telephone interview data was collected. Further data was gathered from an online primarily quantitative questionnaire and a final telephone interview once the course was over. All data was collected using pre-determined questions. The final stage of the research process involved analysis of all data, individually and collectively, to determine the overall utility of the framework, model, and taxonomy, including their ability to assess whether or not online graduate level learners require a learner-determined paradigm to most deeply and perpetually integrate emerging technologies into their lives on demand. Greater detail about the research design, implementation, and data analyses procedures is presented in Chapter 4.

Table 1

Dissertation Study Research Stages

Stage	Details
1	Development and testing of paradigm shift framework, model, omni-tech taxonomy, and related instruments; pilot testing of research process, models, and instruments
2	Pre-course online questionnaire data collection
3	Mid-course telephone interview data collection
4	Post-course online questionnaire data collection
5	Follow-up telephone interview data collection
6	Data analyses from all instruments, individually and collectively

This dissertation contains six more chapters. Chapter 2 includes a review of literature on the theory, nature, and power of learning from a critical pragmatic perspective. It begins by providing a comparative look at four learning paradigms, and three teaching and learning approaches. Next, the notion of natural learning is explored. These conceptions of natural learning are then compared to recent discoveries in neuroscience which, in turn, leads to a discourse on perceptual and transformative learning. The aim of this review on natural learning is to illuminate the disparities and congruencies between the practical application of theoretical perspectives on learning and what is known about the natural learning process. The final section of Chapter 2 considers the purpose of education and related issues of power and control over learning, before introducing the next chapter with the promise of DE.

Chapter 3 delves into the technology-enabled phenomenon of DE. The chapter opens with the topic of the technology-enhanced erosion of time and space, which is rapidly changing the face of DE. The topic is expanded upon as emerging technologies are explored within formal and informal learning contexts. The notion of omni-learning and the paradigm shift model are then presented, before moving on to the introduction and comparative analysis of some mobile learning frameworks and technology integration taxonomies, including the omni-tech taxonomy. The chapter closes with an overview of how the model and taxonomy are to be used for the project.

Chapter 4 focuses upon the research design for the study. A brief review of the research purpose and related questions opens the chapter. After briefly revisiting the critical pragmatic research paradigm that the study is based upon, the transformative mixed methods methodology is presented, along with an explanation for how this methodology fits into the overall design of the project. The research study is then introduced, including sub-topics on population and sampling, as well as data collection processes and instruments. Finally, the project timeline is presented.

Chapter 5 offers the results of the study. The chapter opens with presentation of quantitative data gathered primarily from pre-course and post-course online questionnaires. Qualitative results from interviews are then presented. The chapter cumulates with the merged quantitative-qualitative data analyses results. Information from course webpages, instructor interviews, and the researcher's journal are also presented where appropriate in the chapter.

Chapter 6 highlights patterns and outlier results reported in the previous data analyses chapters, discusses their relevance and relationship to available literature, and considers them within the context of the research questions posed in this study.

Chapter 7 draws the dissertation to its conclusion. Salient findings are reviewed and discussed within the contexts of online learning, as well as the broader DE landscape, and academic community. The value of the paradigm shift framework for informing and directing learning is assessed and shortcomings of the study are considered. Recommendations for improving learner-empowered emergent technology integration for on-demand learning are presented and future research suggestions are made. Finally, the significance of this study for educational stakeholders is considered.

Chapter II: THEORY, NATURE, AND POWER OF LEARNING

This chapter is devoted to antecedents about the theory, nature, and power of learning as interpreted from selected literature. The intention of this chapter is to provide a rich, chronologically- organized description and comparative analysis of two disparate beliefs about how humans learn. The first position adheres to the notion that the source of knowledge is found within the individual human mind. The second position argues that knowledge is gained from the external world through the human senses. The picture developed from a critical pragmatic review of these opposing stances provides the backdrop for the paradigm shift framework, which is presented in Chapter 3. This framework, in turn, is used to develop the research instruments employed to gather data that answers the questions poised in this project, and thus addresses the identified problem that prompted this investigation.

A critical pragmatic lens is used throughout Chapter 2 to help compare and assess the value that each epistemic position holds for individual learners and collective humanity. Using this lens, review of four educational paradigms and their related approaches to teaching and learning is undertaken. In brief, the first and still most systemically-prevalent educational paradigm to emerge is behaviourism, which strictly adheres to the sensory-based epistemology (Atkisson, 2010; Hammond, Austin, Orcutt, & Rosso, 2001; Hauser, n.d.; Laliberte, 2009). Subsequent paradigms of cognitivism, constructivism, and connectivism blend the two epistemic positions to varying degrees (Atkisson, 2010; Laliberte, 2009). However, based upon the reviewed literature, the practical application of these latter three paradigms indicates that none demonstrate a complete epistemic or systemic break from the sensory-based behavioural paradigm (Emery, 1981; Matthews, 2015; Sjøberg, 2007; Suchting, 1992).

The chapter takes a two-step approach to exploring why the sensory-based behavioral paradigm remains so pervasive in the field of education. First, a review of academic literature, including recent discoveries on neuroscience, is undertaken to determine what is known about how humans learn naturally and how this relates to behaviourism. This review indicates that from the time of birth, humans inherently learn through perceptions (Bower, 1966; Slater, 2002). The ensuing discussion on perceptual learning characterizes learning as an individual, holistic experience that dynamically incorporates cognitive, affective, and neurophysiological functions. Internal motivations prompt the development and adaptation of perceptions. Thus learners, *and only learners*, can control and govern their own learning (Emery, 1981; Goldstone, 1998; Moore, 1967). These discoveries weaken the rationale for adherence to the behavioural paradigm by any educational community that places premium value on learners and the learning process.

Since the reviewed literature on natural learning does not appear to support the theory and practice of behaviourism in education, the second step to discovering why behaviourism remains so resilient is to examine what purpose education serves for individual and collective humankind. Herein, a synthesis of reviewed literature concludes that the most common reason for the pursuit of education is to satiate the utilitarian needs of society (Gros, 2016; Hamm, 1989; Keller, 2008). Very few individuals pursue education for the sake of enriching their minds or challenging the status quo (Hamm, 1989). This is of little surprise, given that generations of learners have been, and continue to be indoctrinated through mainstream education with the behavioural value of instrumental reasoning at the expense of rational and creative thinking (Bourne, 1917; Brookfield, 1990; Emery, 1981; Heimlich & Nordland, 2002; Owens, 2013; Robertson, 1997).

It becomes evident from the reviewed literature that the behavioural paradigm persists because it serves to enslave the masses for the profit of a pittance of social elite, rather than to empower learners and emancipate humanity (Bourne, 1917; Emery, 1981). Yet, according to Kant (1781/2013; 1784/1997) and Freire (1970/1993), the only way for learners to escape educational enslavement is for learners to emancipate themselves. This means that *learners* must first recognize and devalue the conditions of their enslavement.

Then *learners* must break the bonds of oppression by empowering themselves to direct their own learning (Freire, 1970/1993). Thus, the next section of this chapter explores the issue of power and control over learning in order to provide insight into how different the behavioural and perpetual worlds of learning are. Institutional, curricular, instructional, and contextual factors associated with the two paradigms are described. Each factor is also analyzed to determine who controls the power, how and why it is controlled, and what effects this control has on the individual learner and collective humanity. This part of the literature review is then used as an analytical reference when asking student respondents to identify who controls, and who should control what factors in their individual learning environments. The goal has been to determine if these respondents perceive themselves to be self-empowered learners.

Upon nearing the end of this critical pragmatic review of the literature on the theory, nature, and power of learning, it is concluded that learners can hope to realize their full potential as learners only by experiencing a complete epistemic break from the behavioural paradigm (Emery, 1981). One venue may offer a systemic opportunity for such a break. That venue is DE (Wedemeyer, 1971). It is thus with great optimism that the chapter concludes with the promise of DE for learner empowerment and societal emancipation. With this overview in mind, the chapter now opens with the introduction to the theory of learning.

The Theory of Learning: A Critical Pragmatic Perspective

Written accounts on various theories about learning are traced back to the Greek philosophers, Socrates (469 –399 B.C.), Plato (427 – 347 B.C.), and Aristotle (384 – 322 B.C.). As a rationalist, Plato believed that truth and knowledge are found within the individual. Aristotle, the empiricist, countered that truth and knowledge can only be gained by sensory interaction with the world (Hammond et al., 2001). Debates over the internal versus external source of knowledge and truth have raged on, forming the basis of learning paradigms and theories ever since.

It was during the Industrial Age that the emerging field of psychology adopted the philosophical ideals on learning first identified by Plato and Aristotle 2,500 years before. The result was the development of three major learning paradigms that have remained the theoretical basis for most educational practices to this day (Hammond et al., 2001).

Learning paradigms.

Kuhn's (1962) use of the word, *paradigm*, was initially meant to describe the shared beliefs, theories, methods, and instruments that particular research camps adhered to. It has since been adopted more broadly to describe certain schools of thought in other fields (Bird, 2013). Psychologists and educators, for example, use the term to describe over-arching learning theories or research programs (Driver & Easley, 1978; Lakatos, 1970; Sjøberg, 2007). It is this broader adoption of the term that is used in the dissertation.

In other words, for the purpose of this dissertation the term, *research paradigm*, is used to describe the beliefs, theories, and practices of a particular research camp. When the term, paradigm, is used within this context, it is always in reference to research paradigms. On the other hand, the term, *learning paradigm* (or *educational paradigm)*, is used to describe the shared beliefs, theories, and practices (including research practices) associated with particular educational groups, or schools of thought, such as behaviourism or cognitivism. Within the context of discussions devoted solely to learning paradigms, the term, paradigm, is meant to be understood as a learning paradigm, unless it is specifically identified as a "research paradigm."

The following discussion centers around four learning paradigms: behaviourism, cognitivism, constructivism, and connectivism. These paradigms are presented chronologically, starting with the first of the four learning paradigms to emerge, behaviourism.

Behaviourism.

Although there are a number of psychologists who have offered significant contributions to the formation of behaviourism as a unique paradigm, literature most often credits: (1) Thorndike, who established three laws of learning: effect, readiness, and exercise (based upon research on animals escaping from cages; Thorndike, 1911/2004); (2) Pavlov and his theory on classical conditioning (for example, the salivating dog experiments; Pavlov, 1927/2004); and (3) Watson, who used his research on little Albert and the rat to discredit the idea of innate knowledge (Watson, 1907/2004). A fourth, self-proclaimed radical behaviourist was Skinner, whose controlled pigeon-feeding experiments established proof for his theory of operant conditioning. While Skinner acknowledged that innate psychological and physiological functioning existed, he argued that they could not be observed or objectively measured. What could be seen and measured was behaviour. Changing behaviour simply required *operant conditioning* – repeated exposure of a subject to a stimulus, and then reinforcement of the subject's behavioural response until the desired behaviour modification was achieved (Skinner, 1953).

Behaviourism was the first significant learning paradigm to be adopted by 20th century educational institutions, which had recently metamorphosed from millennia as purveyors of knowledge for the elite few to government-funded disseminators of mass public education. Since behaviourists viewed evidence-based learning as a stimulus-response process reinforced by a system of external rewards and punishments (Atkisson, 2010; Hammond et al., 2001; Hauser, n.d.), it was imperative that external stimuli and behaviour reinforcements be controlled by the teachers and administrators operationalizing this paradigm. Managing external stimuli and behaviour was easier in highly structured, localized environments where students sat in neat rows inside lab-like classrooms. Teacher lectures and student note-taking enabled prudent use of scarce, pricey resources, while ensuring appropriate delivery of government-sanctioned curricula. Students were passive learners who were conditioned to memorize and carry out rote tasks and take orders without question. Education was delivered through the use of independent seatwork, time sensitive responses (such as tests and assignments), and reward or punishment (like teacher-assigned letter grades; Gregory, 2016; Kazamias, 2009; Laliberte, 2009; Tomic, 1993).

Once put into practice, the flaws in reasoning behind behaviourism became increasingly evident. Cognitivists argued that by ignoring the inner workings of the mind, behaviourism was limited in its ability to explain the learning process (Chomsky, 1959; Graham, 2016). Children did not have empty minds. Instead, they possessed unique internal subjective structures of the world. What was learned and how it was learned depended upon how well the new learning fit within their minds' pre-existing structures. Internal physiological and psychological factors, such as emotions and motivation, greatly affected the desire and ability to learn. Thus, this one-size-fits-all approach to learning failed learners (Laliberte, 2009). Perhaps, some suggested, the main reason why behaviourism fell short in educative practice was because foundational theories were derived primarily from empirical research on animals (Atherton, 2013; Chomsky, 1959; Graham, 2016).

Although tenets, structures, and practices of behaviourism have remained deeply entrenched in educational schema to this day, especially in public school systems and training facilities, it had lost much of its appeal for educators by the late 1950s (Laliberte, 2009). By this time, cognitive science had made significant inroads in academia, leading the way for a new learning paradigm, cognitivism.

Cognitivism.

Cognitivism joined behaviourism as a dominant paradigm in education by the 1960s (Gregory, 2016; Laliberte, 2009). Aligning themselves with Plato, cognitivists believed that knowledge was encoded and stored as symbols in the brain (Laliberte, 2009). The resulting structures were commonly called mental maps, schema, or conceptual frameworks (Gregory, 2016; Laliberte, 2009).

Many noteworthy scholars, such as Piaget (1896-1980), Bruner (1915-2016), and Vygotsky (1896-1934), contributed to the development of cognitivism. Piaget's (1968) theory of genetic *epistemology* (that is, a theory based upon justified beliefs; Guba & Lincoln, 1994) was derived from cognitive experiments conducted on three children and his earlier epistemological perspectives (Barrett, 1973; Piaget, 1952, 1968). Embedded in this learning perspective were three tenets: innate knowledge existed, learning was an active process, and the ultimate goal of learning was to develop a mind capable of abstract logic (Piaget, 1952; 1968).

Bruner (1960) agreed with Piaget on many points. Children possessed the innate ability to learn, were curious and active learners, and their cognitive abilities developed over time. Furthermore, knowledge involved the acquisition of symbols. Nevertheless, Bruner's belief in *discovery learning* (that is, "all forms of obtaining knowledge for oneself by the use of one's own mind," Bruner, 1961, p. 21), led him to disagree with Piaget as well. Bruner asserted that learning was a continuous process not marked by stages. Language was a cause, not a consequence of learning. Finally, symbolic thought did not replace earlier models of representation (Bruner, 1960; 1961). Bruner (1960) advocated for a *spiral curriculum*, one in which increasingly complex levels of knowledge about a particular topic were presented to the growing child by adult guides through *scaffolding* (or helpful, structured interaction to support learning). The key was to pull support away when it seemed that the learner had sufficient bits of knowledge to make sense of their learning (Wood, Bruner, & Ross, 1976).

Bruner's notion of scaffolding was mirrored by Vygotsky's (1978) *Zone of Proximal Development* (ZPD) model. The premise underlying Vygotsky's (1978) ZPD was that learning was primarily a socio-cultural process. Furthermore, it underscored the need for educators to discard behaviouristic traditions in favour of active, inter-disciplinary approaches supported by knowledgeable guides (Vygotsky, 1978).

Despite the new insights on learning and practical teaching suggestions that it offered, cognitivism began to fall out of favour with many academics within a few decades (Laliberte, 2009). Critics such as Descombes (1995/2001) recognized that cognitivists and behaviourists shared some fundamental beliefs that did not reflect the true nature of learning. Both camps assumed that knowledge was a given and absolute (Laliberte, 2009). Furthermore, by referring to learning as the input, processing, and output of symbols, cognitivists shared the behaviourists' view of knowledge acquisition as deterministic and mechanical in nature (Atkisson, 2010; Descombes, 1995/2001; Laliberte, 2009; Searle, 1990). Neither camp accounted enough for individual differences between learners (Laliberte, 2009). Nor, as de Sousa (1990), Debes (2009), and Pound (2012) pointed out, did either sufficiently address affective characteristics and development in learning (Charland, 2009; Laliberte, 2009).

The merits of such criticisms may be debateable. For example, Piaget's taxonomy highlighted, rather than ignored individual differences, while conceptions of scaffolding, discovery learning, and spiral curriculum, as well as Vygotsky's (1978) assertion that learning was culturally bound suggest that, at least to some extent, these theorists recognized individual differences in learning. Secondly, Vygotsky deeply appreciated the role that the affective domain played in learning (DiPardo & Potter, 2003; Vygotsky, 1986). These examples also underscore scholarly disagreement about whether or not Piaget, Bruner, or Vygotsky were cognitivists or constructivists (Anderson, 2010; Ertmer & Newby, 2013; Laliberte, 2009; Sjøberg, 2007). Partial explanation for this confusion is found in the fact that Piaget's work is often associated with individual and cognitive constructivism, Bruner's with cognitive constructivism, and Vygotsky's with social constructivism (Gregory, 2016; Jones & Brader-Araje, 2002; Liu & Matthews, 2005; Sjøberg, 2007). Piaget, Bruner, and Vygotsy are also recognized as "the founders of educational constructivism" (Matthews, 2015), to which attention now turns.

Constructivism.

Cognitivism began to branch into constructivism by the late 1970s as educators became increasingly engaged with revising and building upon children's existing paradigms, theories, conceptions, and ideas (Driver & Easley, 1978; Sjøberg, 2007). By the dawn of the 21st century, it had become a dominant educational paradigm. (Liu & Matthews, 2005; Matthews, 2015; Sjøberg, 2007).

Like cognitivists, constructivists view learning as a mental activity. Nevertheless, they depart from cognitivists on a number of significant points. First, cognitivists and behaviourists assert that knowledge is independent of our minds; knowledge is *acquired* by learners. Conversely, constructivists believe that knowledge is mind-dependent; learners *create* meaning through individual interpretations of their worldly experiences. Secondly, while cognitivists view human minds as reference tools to the real world and behaviourists consider experiences with the environment to be tantamount, constructivists marry these two views, asserting that knowledge is the process and product of both. Constructivists believe that since the construction of knowledge is dependent upon interaction between the internal mind *and* the external world, knowledge is individualized and always open to change. Thus, learners cannot know objective reality (Ertmer & Newby, 2013; Jonassen, 1991; Matthews, 2015; Sjøberg, 2007).

Constructivists believe that educators must decipher and challenge learners' preconceptions to help learners change existing cognitive structures (Sjøberg, 2007; Taber, 2006). Thus, the instructional design takes on an ill-structured, problem-based learning approach in which objectives and assignments are learner-centric (that is, they are focused on developing the learner's needs, interests, and abilities), content is diverse and often compiled from external sources as needed by learners, and assessment is based upon learners' abilities to transfer knowledge and skills from the initial instructional activities to other activities (Ertmer & Newby, 2013). During this process, educators focus on the development of *metacognition* (in other words, assessing, evaluating, and updating one's thinking), using such tools as individualized educational plans (IEPs), social collaboration, and reflective journaling (Laliberte, 2009).

This near reversal from the traditional Industrial Age patriarchal, teacher-centric to the more learner-centric constructivist model sparks countess criticisms and dilemmas. Empiricists are affronted by constructivist assertions that there is no absolute, objective knowledge (Ertmer & Newbie, 2013; Laliberte, 2009; Matthews, 2015). By maintaining that truth and knowledge are subjective and context-bound, constructivist researchers are caught in a paradox, unable to definitively prove or disprove constructivist theories or claims (Matsuoka & Tatsuoka, 2004; Matthew, 2015; Suchting, 1992). Rather than releasing learners from the conformity of traditional educational approaches, Bianchini (1997) and Koslov (1998) argue that the social nature of constructivism reinforces tyranny through *groupthink* (that is, where co-consensus is most valued; Janis, 1971), thus ensuring that the ideals and practices of dominant majorities prevail (Janis, 1971; Matsuoka & Tatsuoka, 2004).

The countless definitions, interpretations, adaptations (see for example, eco-constructivism by Hoven & Palalas, 2016), and resultant disparities in constructivist educational practice are also the source of other vexations (Matthews, 2015; Sjøberg, 2007). Problem-based, ill-structured, contextually authentic learning experiences and individualized, learner-centric objectives, tasks, content, and assessments are denounced as being overly demanding on instructors, less rigorous, and more elitist than traditional learning approaches (Laliberte, 2009; Matsuoka & Tatsuoka, 2004). Furthermore, constructivist practices do not fit well with traditional government-mandated and institutionally-imposed age groupings or timeframes (such as school semesters and reporting periods; Laliberte, 2009). The cumulative result is a desultory application of various constructivist notions and practices woven into the persistent, pervasive Industrial Age behavioural-based educational system (Garbett, 2011; Richardson, 1997). This may be one reason why some critics, like Suchting (1992), Sjøberg (2007), and Matthews (2015), conclude that constructivism is not a new paradigm, but simply a compromise of the Plato/Aristotle debate, coupled with Kantian notions and Socrates' teaching practices; an ephemeral proxy for an emerging paradigm yet to come.

Emerging paradigms: Connectivism.

The number and variety of claims heralding new educational paradigms in the literature are overwhelming. Some of these paradigms are research-focused, such as the *design-based research paradigm*, which "blends empirical educational research with the theory-driven design of learning environments" (Design Based Collective, 2003, p. 5). Others are culturally-driven, such as the *education for sustainability* paradigm (EFS; Sterling, 2014). Many are technology-enabled social learning paradigms, such as *online learning* (Harrasim, 2000), *online social networking* (Richards, 2013), *Web 2.0 of e-learning* (Zemliansky, 2010), *Web 3.0* (Ganzerla, Colapinto, & Rocco, 2015), and *connectivism* (Siemens, 2005a, 2005b). While review and critique of such paradigms is beyond the scope of this study, a brief discussion on connectivism ensues, since it appears to hold relevance to the study.

Connectivists subscribe to the belief that knowledge is emergent, adaptive, networked, and distributed. Knowledge resides in the individual and collective mind, as well as in non-human devices, and is dependent upon diverse views and access to multiple information streams and hubs. Knowledge is not static; old information must be constantly re-examined in light of new discoveries (Downes, 2007; Siemens, 2008a, 2008b).

To connectivists, learning is a physio-psycho-social process in which new neural, conceptual, and external networks grow and evolve. It occurs in complex, chaotic, shifting spaces, and is increasingly aided by technology. Learners contribute to and receive information from *nodes* (or learning communities), which are networked with other nodes. Diverse, but connected, these autonomous networks engage in creative, interdisciplinary knowledge development (Boitshwarelo, 2011; Downes, 2007; Kop & Hill, 2008; Siemens, 2005a, 2008a, 2008b).

While the learning context within a distributed network may include any physical and/or virtual formal or informal learning community, connectivism is frequently associated with *massive open online courses* (MOOCs; Cormier, 2010; Downes, 2012, 2014; Siemens, 2016), or *cMOOCs* (which emphasize interactions and connectivity in the course, facilitated by the use of social media; Downes, 2012). MOOCs are typically tuition-free, offer open access enrolment, have virtual class sizes numbering in the hundreds to thousands of learners, and rely upon digital, often *open source* (OS; that is, non-proprietary) technologies and resources (Cormier, 2010; Downes, 2014; Siemens, 2016). Formal institutions, such as MIT, Stanford, and Athabasca University (AU) currently offer a number of MOOC and cMOOC courses, although the popularity of these courses is quickly spreading to other formal and informal contexts across the globe (Lewin, 2013).

Despite the youth and rapidly growing popularity of connectivism (Siemens, 2005a; Wang, Chen, & Anderson, 2014), criticisms abound. For example, scholars such as Bell (2011), Kerr (2007), Kimmons and Hall (2016), Kopp and Hill (2008), and Verhagen (2006) debate its merit as a theory. Siemens (2008b) counters that connectivism is a theory because it satisfies the five learning principles of a learning theory. He adds that a theory must advance a discipline, as well as explain and predict learning. Siemens believes that as the theory of connectivism evolves, it will meet these three criteria (Siemens, quoted in Kerr, 2007).

Some believe that connectivism, especially as exemplified by MOOCs, is leading the charge in a digital revolution by practicing democratic principles on a scale hitherto unknown in educational history (Carver & Harrison, 2013; Lewin, 2013; Watters, 2014). Illustrations of this democratic practice include free tuition, open access (including access to prestigious educators and institutions), seemingly limitless class sizes, and adherence to the four key learning principles of connectivism: autonomy, diversity, connectedness, and openness (Lewin, 2013; Tschofen & Mackness, 2012). Yet others counter that MOOCs do not deliver on this promise. Some point out that pioneering MOOC educators from prestigious institutions are moving their MOOC offerings to the private sector, while some institutions are discussing minimal tuition fees and for-profit ventures, or limiting MOOC access to their in-house students only (see, for example, Carver & Harrison, 2013; Deimann, 2015; Lewin, 2013; Watters, 2014). Other critics, such as McMillan Cottom (2013) and Willis and Strunk (2015), question just how well the predominately white male "disrupters" leading the connectivist charge can understand, let alone represent the interests or improve the status of marginalized people. Credence for this latter position is found in research conducted on MOOCs in over 200 countries, coupled with Harvard and MIT MOOC statistics, which indicate that most MOOC participants are urban, college-educated male professionals from industrialized countries who have access to required technologies (Emanuel, 2013; Watters, 2014).

The aforementioned theoretical, economic, and democratic concerns represent a pittance of the type and variety of debates about connectivism. Expanded analysis, unfortunately, is beyond this introduction to connectivism. Instead, two final thoughts are offered here. First, time will ascertain if connectivism is indeed an educational paradigm. Time will also establish whether connectivism has the ability to emancipate humanity from the tyranny fostered by traditional educational paradigms.

The critical theme that emerges from this brief historical review of educational paradigms concerns the control of information. Whoever controls information maintains power over what information is given to whom and why, how it is delivered, and what impact it has on the world. Yet, as technologies revolutionize the creation and flow of information, it appears that those who have traditionally controlled information may be losing their grip. Humankind is emerging from millennia characterized by information scarcity to an age of exponentially-increasing information abundance. Nevertheless, the emancipatory power of the digital revolution is far from realized (Emanuel, 2013; Watters, 2014). This relationship between information abundance, increasingly open access, and tenacious control by historically dominant groups continues to be analyzed in the rest of this project, beginning with the learning approaches examined for the study.

Teaching and learning approaches.

Educational paradigms are translated into praxis through various teaching and learning approaches that bind beliefs and theories to methods and practices. The three teaching and learning approaches referenced in the study include pedagogy, andragogy (Knowles, 1970, 1984), and heutagogy (Stewart & Hase, 2001). However, before examination of these three approaches is undertaken, clarification of how the word, *pedagogy*, is used for the study is required.

The word, *pedagogy*, is derived from the Greek word, *paidagogos*; *pais* means “child” (typically a boy), and *agogus* is “leader of.” Thus, paidagogus literally means “leader of a (male) child.” Drawing on its Greek derivative, many scholars understand the term, pedagogy, as the art and science of teaching children (Palaiologos, 2011; Wheeler, 2010).

Nevertheless, varying interpretations of the word, pedagogy, are found in the literature. Definitions by Freire (1970/1993), Newmann and Associates (1996), van Manen (1999), Murphy (1999), Mortimore (1999), and Hamilton and McWilliam (2001), for example, imply that pedagogy is an umbrella teaching/learning approach under which andragogy, heutagogy, and a more narrowly-defined version of the term, pedagogy, reside. While this may indeed be so, for clarification purposes in this study, the umbrella term for the collective three is not pedagogy, but rather *teaching and learning approaches*. When the term, pedagogy, is used in this dissertation, it is intentionally referencing the more narrowly defined concept given below.

Pedagogy.

Pedagogy first emerged between the 7th and 12th century in monastic schools. Monks' assumptions during these centuries about how students learned were reinforced by the behaviourist paradigm that took hold during the onset of mass education in elementary schools in the 1890s and secondary schools in the 1900s (Holmes & Abington-Cooper, 2000). By the early 1900s, pedagogy had moved on to tertiary, adult, and management education, and industrial training (Emery, 1981). It has remained the dominant teaching and learning approach in formal educational institutions to this day (Emery, 1981; Keller, 2008; Murphy, 1996).

Influenced by empiricist Aristotelian/Lockean philosophies and associative psychology, educators believed that learning occurred when causal relations and conceptual notions formed in the mind as the senses absorbed external stimuli (Emery, 1981). Experiences of individuals were discarded by educators as inadequate sources of knowledge; learning was mastered when students demonstrated the accurate acquisition of sanctioned "scientific" (or truthful, factual) knowledge and logic. The hierarchy of increasingly complex levels of knowledge to be mastered was pre-established by a collective of prestigious scholars and other dominant political, social, and cultural powers (Bourne, 1917; Emery, 1981; Freire, 1970/1993). The government-standardized, lineally-structured curriculum was designed to transmit snippets of age- or level-appropriate subject-specific knowledge and skills (Murphy, 1996), which were often divorced from the learners' real world contexts, interests, needs, or abilities. Since they were charged with ensuring that learners made the "correct" associations and generalizations at each level, teachers had to strictly control the source, type, and timing of environmental stimuli. Students were tasked with passively and compliantly absorbing these narrow stimuli, reliably regurgitating that which was not always understood by them. Student discipline and literacy preceded knowledge acquisition, and motivation was ensured through institution- and teacher-delivered external rewards and punishments (Hase & Kenyon, 2001, 2013; Murphy, 1996; Palaiologos, 2011).

What facts, skills, and values that needed to be transmitted and how proof of this learning was demonstrated were the primary foci of pedagogical practice (Katsuko, 1995). Concentration was on developing students' lower level thinking skills (as defined by Bloom's taxonomy; Anderson et al., 2001; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Krathwohl, 2002; Krathwohl, Bloom, & Masia, 1964), such as rote memorization and recall of facts, classifying, explaining, or describing accepted ideas and concepts, and applying this learning to solve new problems, demonstrate understanding, or operate as trained to (Murphy, 1996).

Over time, progressive work by developmental psychologists and educational teachers and researchers cast growing doubt on the value of pedagogy (Holmes & Abington-Cooper, 2000; Rogers, 1969), especially for teaching adults (Knowles, 1970, 1984; Piaget, 1952, 1968). By the 1980s an adult learning theory, known as andragogy, was gaining popularity in North America.

Andragogy.

Although scholarly work often credits the American educator, Malcolm Knowles, as the father of andragogy, the term was first used by Kapp in 1833 to describe Plato's educational theory (Nottingham Andragogy Group, 1983). Since the word, *andragogy,* was derived from the Greek roots, *aner*, meaning "man, not boy," and *agogus*, "leader of," andragogy was defined by Knowles as "the art and science of helping adults learn" (Holmes & Abington-Cooper, 2000).

Heavily influenced by humanism, psychology, and psychosocial development theories of his day, Knowles posited that adult learning should be holistic; encompassing emotional, psychological, and intellectual facets of the learner. The mission of adult education, he argued, was to help adults become self-directed learners. To help adult learners achieve this end, the role of the educator became one of facilitation and support (Holmes & Abington-Cooper, 2000; Knowles, 1980). Knowles' (1970) exploration of the self-directed learning (SDL) process for adult education led to his conception of andragogy.

Knowles (1973) distinguished andragogy from pedagogy by asserting that pedagogy was based upon a teacher-directed content transmission model that focused upon *what* skills and information needed to be taught. Andragogy was a process-driven enterprise that concentrated on *how* to help learners acquire skills and information with ever-lessening teacher support. Underlying these distinctions was Knowles' assumption that adult learning differed from child learning because adults: (1) were more self-directed, (2) had more experience to draw from, (3) were more interested in learning for social reasons, and (4) were more focused on problem-based learning.

The process-oriented enterprise, as envisioned by Knowles (1973), profoundly changed the learning equation. The classroom environment became less formal. Rather than assuming the role of authority figure and ultimate source of knowledge, the teacher modeled and encouraged respect, mutuality, and collaboration. Teacher-determined instructional delivery became a student-teacher process involving shared responsibilities for student learning diagnoses, planning, formulation of objectives, experiential learning, problem-solving, and evaluation. Individual consumption of seatwork was replaced with social interaction and discourse among and between students, their teachers, and possibly others, leading to negotiations of meaning and shared understandings.

Andragogy was swiftly adopted by adult education as well as other fields, such as nursing, social work, business, religion, agriculture, and law (Davenport & Davenport, 1985). Along with this broadening adoption came a chorus of criticisms typically derived from differing philosophical orientations; debates over whether andragogy was "a theory, method, technique, or set of assumptions" (p. 152; see also Hartree, 1984; Kerka, 1994); and doubts expressed by scholars such as Knudson (1980), Rachal (1983), and Mohring (1990), about the overall purpose and utility of the term in adult education.

By 1980, Knowles no longer viewed child and adult learning as dichotomous, asserting instead that pedagogy and andragogy were actually two ends of the same spectrum. Furthermore, the situation, not the age of the learner, should determine which teaching approach was best. Rachal's (1994) review of experimental research comparing andragogy to pedagogy supported Knowles' new stance. While noting disappointment in uncovering only a handful of such experiments despite the widespread use of andragogy at that time, Rachal's (1994) examination of these studies led him to conclude that: (1) there was no significant difference in student achievement and satisfaction between the two approaches, and (2) educators would continue to use whichever approach worked best for them.

Looking towards the future, Bedard (1997) suggested that the digital age would offer increasing opportunities for learning outside of formal teacher-student interactions. In this new age of information proliferation, complex social networks, and rapid workplace transformations, self-directed learning (SDL) abilities would be imperative. Knowles concurred, predicting that, "By 2020, all learning--from elementary school through post-graduate education--will be based on the principles of self-directed learning" (as quoted in an interview with Hatcher, 1997, p. 37).

Merriam, Caffarella, and Baumgartner (2007) examined andragogy from the perspective of learner empowerment. These scholars noted that while one of the three main goals of self-directed learning (SDL) was "[to promote] emancipatory learning and social action" (p. 129), their exploration of the literature yielded only one SDL instructional model that explicitly addressed this aim. They concluded that unless certain political conditions were met, the organizational culture in an SDL environment might limit learner control, or provide less access to learning resources for the marginalized, for example. Acknowledging Gray's (1999) speculation that the Internet could become a very powerful SDL tool, Merriam et al. (2007) agreed that the Internet had the potential to liberate learners by overcoming time, place, and resource barriers, offering new delivery modes, and equalizing learning opportunities. Yet, they argued, user imbalances in gender and income still existed, vested interests still sought to control transmission and access to information, and online learning deficiencies remained poorly addressed.

The purpose herein is not to distill a single definition of andragogy or resolve any of its debates, but to provide a basic foundation for distinguishing it from pedagogy and heutagogy in the suggested paradigm shift framework. With this purpose in mind, the discussion now moves on to heutagogy.

Heutagogy.

Derived from a tweaking the Greek root words, *now-tog*, meaning "self," and *agogus*, or "leader of," *heutagogy* is defined as "the study of self-determined learning" (Hase & Kenyon, 2001). The founders of heutagogy, Hase and Kenyon (2001), describe this learning approach as an extension of, rather than a departure from, andragogy and SDL. Knowles (1970) defines SDL as "(t)he process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing learning strategies, and evaluating learning outcomes" (p. 7). This definition exemplifies a lineal, or *single-loop*, approach to learning. Heutagogy, however, incorporates intuition and *double loop learning*, which "are not linear and not necessarily planned" (Hase & Kenyon, 2001).

In short, heutagogy is a humanistic learning (not teaching) approach that incorporates constructivism, neuroscience, cognition, affect, motivation (Pink, 2009), active learning and reflection (Argyris & Schön, 1978; 1996), Complexity Theory (Lissack, 1999; Stacey, Griffin, & Shaw, 2000; Waldrop, 1992) and systems thinking (Blaschke & Hase, 2016; F. Emery & Trist, 1965; M. Emery, 1993; Hase & Kenyon, 2001, 2013). While pedagogy focuses on *what* should be learned (in other words, the product) and andragogy dwells upon *how* to learn (the process), heutagogy incorporates the *what*, *how*, *where* (the context), and perhaps most importantly, the *why* (the meaning), and *who* (who is included and who controls the power) of learning (Hase & Kenyon, 2013). Yet what makes heutagogy most unique is its epistemic break from traditional educational theory.

Emery (1981) argues that the reason why progressive thinkers such as Montessori, Dewey, Neill and Lewin failed to emancipate learners from the traditional educational paradigm is because "*the core of the traditional educational paradigm lies in epistemology, not in educational practice* [emphasis in the original]" (p. 3). A paradigmatic shift will not occur until educational stakeholders reject the empiricist epistemology that assumes: (1) the mind is a clean slate at birth, and (2) concepts of objects, ownership, or causal relations are inferred by the mind as senses absorb external stimuli.

Drawing on evidence garnered from disparate fields of research such as physics, psycho-physics, chemistry, biology, mathematics, language, and music, Fred Emery (1981) presents what he calls the *Heider/Gibson paradigm* (herein referred to as the *perceptual*, or *learner-determined learning paradigm*), which offers an alternative view on learning. At the risk of greatly over-simplifying Emery's excellent description of and riveting argument for it here, the new paradigm posits that through a process of generalizing individual perceptions (pattern-making), people make sense of the world, conceptualize, and perceive invariances. Furthermore, people learn continuously throughout life in real time by interacting with their environment. Even if conditioned as pedagogical learners, people can re-learn how to learn naturally (Emery, 1981; Rogers, 1969), thereby enhancing motivation, cognition, and creativity (Hase & Kenyon, 2013). The paradigm rests on three beliefs: perceptions are innate; perceptions, *not* sensory stimuli, are the key to learning; and learners control their power to learn (Emery, 1981; Hase & Kenyon, 2001, 2013).

The epistemic acceptance of this learner-determined educational paradigm challenges every aspect of the pervasive, traditional patriarchal educational system. Indoctrinated for millennia to believe that only the custodians of formal education hold the keys to true knowledge, learners are now charged with "learning to accept [the learners'] own perceptions as a direct form of knowledge and learning to suspect forms of knowledge that advance themselves by systematically discounting direct knowledge that people have in their life-sized range of things, events and processes" (Emery, 1981, p. 41).

In this new paradigm the learning process, timing, and outcomes are tailored to learner needs and contexts. The learner assumes control and responsibility for their learning, while the educator acts as a transient facilitator. The traditional learner's passive acceptance of educational inculcation aimed at developing learner *competencies* (that is, acquisition of knowledge and skills measured in the immediate learning environment; Hase & Kenyon, 2013; Tay & Hase, 2004) becomes the heutagogical learner's active engagement in the growth of learner *capabilities* (defined as "deeper cognitive processes…using competencies in new contexts and challenging situations"; Hase & Kenyon, 2013, p. 25).

Hase and Kenyon (2001, 2013) state that heutagogy is based on the constructivist notion that people actively and continuously build individual conceptions of reality by marrying previous experiences and knowledge with new ones. Furthermore, the learning process requires a creative, dynamic relationship between *teacher* (or "*learning leader"*; Hase, 2014, 2015) and learner.

Although Hase and Kenyon (2001, 2013) provide a reasoned argument for identifying kinship between heutagogy and constructivism, there appears to be significant alignment between heutagogy and connectivism as well (even though the heutagogical term, self-determined learning, is not synonymous with learner autonomy in MOOCs, according to Hase, 2015). To illustrate, connectivism and heutagogy are based upon humanism and Complexity Theory. Secondly, Blaschke and Hase (2016) claim that heutagogical self-determined learning draws on "Deci and Ryan's (2002) self-determination theory of learner motivation and autonomy" (p. 26), while Tschofen and Mackness (2012) use Deci and Ryan's self-determination theory to help practitioners better understand how learning occurs in MOOC settings. Some other commonalities include: participatory learning; knowing how to learn and where to find information; learning for an unpredictable future; lifelong and life-wide learning; formal and informal learning; learner empowerment; open systems, social networks, and personal learning contexts; and the role that emerging technologies play in the fluxing landscape of learning (Blaschke, 2013; Blaschke & Hase, 2016; Cormier, 2010; Downes, 2007; Hase & Kenyon, 2001, 2013; Siemens, 2005a, 2005b, 2008a, 2008b, 2010, 2011, 2016). Yet, outside of Hase's (2015) single comment about clarifying terms, the founders of connectivism and heutagogy seemingly abstain from public discourse on possible relationships between the two, leaving scholars to draw their own conclusions.

For now, further connectivist versus heutagogy musings are set aside, along with discussions on heutagogy and neuroscience, cognition, affect, motivation, active learning and reflection, and context, which are all reviewed in greater detail in the rest of this and subsequent chapters. Instead, this brief overview of heutagogy concludes with some of its impediments.

Heutagogy opposes the traditional dogma of how people learn and the conventional methods of teaching practice (Hase & Kenyon, 2013). While recognizing the value in empowering students to take charge of their own learning paths, proponents of heutagogy say that some scholars doubt the practicality of heutagogy, especially in pedagogically-driven higher education institutions where patriarchal stakeholders disallow student control in areas such as assessment. Heutagogy may be perceived as a threat to the status of these stakeholders and their governing bodies. There is also faculty reluctance to implement new teaching methodologies and the emergent technologies that support such practices (for example, fear of relinquishing power over the learning process to learners, resistance to change, lack of adequate in-service and support, and shortage of time or resources); many simply prefer to teach the way they were taught (Blaschke, 2012; Hase & Kenyon, 2013; McAuliffe, Hargreaves, Winter, & Chadwick, 2008). Yet it is possible that by embracing a new transformative learning model, scholars may experience not only the sense of accomplishment that comes with helping others become self-determined learners, but also realize greater personal (Hase & Kenyon, 2013) and collective academic transformation as well.

Indoctrinated with pedagogical dogma and practice, some students are also ill-equipped to adopt a self-determined approach to learning. Noting such realities, proponents of heutagogy suggest implementation of small changes over time, such as providing greater initial scaffolding in the learning process for students who lack confidence or direction in taking over their own learning (Blascke, 2011).

After completing a review of available literature and research on heutagogy, Blaschke (2011) notes that much research on heutagogy still needs to be undertaken. Examples of deficit areas include: defining heutagogy; examining the relationship between heutagogy, web 2.0, and social media; and investigating the effectiveness of heutagogy in higher education, its ability to transform competencies into real-world capabilities, and its achievement in fostering lifelong learners.

Heutagogy, its supporters claim, has the ability to transform educational practice by developing methodologies that enhance higher and deeper levels of cognition, foster positive emotional development and creativity, and instill intrinsic motivation in students to become lifelong self-determined learners (Blaschke, 2012, 2016; Hase & Kenyon, 2001, 2013; McAuliffe et al., 2008). It remains to be seen if heutagogy has sufficient appeal and power to emancipate learners (and learning leaders) from their pedagogical chains.

Before moving on to an expanded discussion on natural learning and how it relates to the perceptual learning paradigm upon which heutagogy is based in the next section of this chapter, a summary of this section on the theory of learning is offered.

The theory of learning: a summary.

A review of the learning paradigms and the teaching and learning approaches that have emerged from them reveals two seemingly disparate epistemological stances. On the one side there is the belief that learning is the result of sensory stimuli input. This viewpoint manifests itself as a utilitarian, mechanistic one-size-fits-all approach to learning. The learning environment is a sterile empiricist classroom laboratory controlled on high by the elite, whose sole aim is to use the educational system to command and manipulate the proletariat for political and economic gain. The function of education is to eradicate learners' belief in their own, un-credentialed skill and knowledge, rendering them wholly dependent upon the fragmented, lineal curriculum, their omnipotent teachers, and the lower-level cognitive skills required for a life of unquestioning labour. In this equation, technology is a means to increasing the efficiency of knowledge transmission which, in turn, further entrenches the power of the social elite.

The other epistemological position subscribes to the belief that innate perceptions hardwire people as natural, curious, lifelong, and life-wide learners. Thus, only learners can control their individual power to learn. The universe is the classroom and the curriculum is holistic, dynamic, chaotic, complex, and individualistic. Educators are transient learning leaders and guides encountered along individuals' learning paths. The purpose of education is not to train learners for a specific job, but to empower them to apply existing knowledge, skills, and innate abilities in novel manners to future, potentially unimaginable situations. Technology becomes an enabler, allowing learners increasing opportunities to capture, create, curate, investigate, and communicate in multimedia formats whatever information they desire, upon demand. As such, technology is recognized as a tool for emancipating learners from the tyranny of traditional education and equalizing the creation and flow of knowledge among all, while fostering natural learning abilities.

One way to assess the value of the above-mentioned theories on, and approaches to learning is to compare them to literature on how humans naturally learn.

Natural Learning

Some appreciation for why natural learning is embraced by noteworthy scholars such as Rogers (1969), Addams (Deegan, 1988), Dewey (1910/2011, 1916/2007), Freire (1970/1993), Emery (1981), and Hase and Kenyon (2013) begins by reviewing various perspectives, facets, and potentials of natural learning.

Historical perspectives.

Subscribing to Plato's assertion that learning is innate (Samet, 2008), Dewey describes children as instinctively curious, eager, and dynamically active learners whose interests intrinsically motivate their desire to learn. According to Dewey, learning naturally occurs in any setting, is often social, and continues throughout life (Benson, Harkavy, & Puckett, 2007; Dewey, 1897, 1903, 1916/2007). Freire (1970/1993) extends these conceptions of natural learning by claiming that humans are born with the conscious desire to become better humans. Freire believes that humanity has the ability to rid itself of mythicized, fractured notions of its existence as separate from the world by increasing the scope and power of inherent critical perceptions and creative energies. It is only through this process that humankind can transform reality into a more humane phenomenon.

These notions of natural learning continue to find traction today. For example, after devoting decades to research on motivation, Pink (2009) concludes that learning is a natural part of the innate human need “to direct our own lives, to… create new things, and to do better by ourselves and our world (p. 14).” Like Montesori (Emilyj, 2014), Pink (2009) recognizes that we are motivated by a desire to achieve mastery. Pink (2009) also concurs with Freire (1970/1993) that we are driven by the need to find purpose and to attain autonomy in life.

Hase and Kenyon (2013) draw a wealth of ideas about what natural learning is from observing pre-school children. These scholars describe such children as highly motivated, curious, competent, creative, holistic learners, who are naturally confident in their ability to learn. Such children never hesitate to ask questions or take risks “until content and process are pulled from their grasp by schooling” (p. xxxvi). By returning the power of learning to learners, heutagogy reconnects learners with “[their] natural ability to explore, ask questions, and make connections” (p. xxxi).

These historic and current perspectives on natural learning are supported by recent findings in neuroscience.

Recent discoveries in neuroscience.

Recent neurological findings characterize the brain as being dynamically unique, plastic, and open to learning throughout life (Halpern, 2011; Hase & Kenyon, 2013; Kluger, 2011a, 2011b, 2011c; Kluger & Stengel, 2011). This suggests that learning is an individual, contextually-dependent experience that is active, intriguing, and meaningful to the learner. The more that a learner does with a new snippet of learning, the more neural networks are formed in the brain related to that learning. Enriched environments increase chances of learning (Hase & Kenyon, 2013). Ultimately, the neurology of learning highlights that what is most crucial is not what is *taught*, but rather what is *learned*. It appears, then, that the brain is naturally predisposed to the holistic, independent capacity and capability of perceptual learning; a statement that is expanded upon below.

Perceptual learning.

Perceptual learning as a process of organizing neural information into meaningful patterns that are derived not only from the interplay between the nature and context of an experience and the physiology of the sensory apparatus, but also by the perceiver's past experiences and frame of reference (for example, the perceiver's cultural context and genetics). This explains why someone can describe the colour, shape, and size of an object, even if they only capture a fragmented glimpse of it (Moore, 1967). Historically-dominant behavioural science used to argue that the complex visual perceptual abilities of adults are built upon the simple sensory information babies begin to absorb from the time of birth (Moore, 1967). Researchers now realize that newborns learn "rapidly about visually experienced stimuli and events, and [that] this learning is both flexible and influenced by inherent (unlearned) constraints and biases" (Slater, 2002, p. 73; see also Bower, 1966). Furthermore, these perceptions are well-organized (Slater, 2002).

The study of perceptual learning has been garnering growing interest in a number of fields in recent decades. Drawing upon "research from cognitive psychology, psychophysics, neuroscience, expert/novice differences, development, computer science, and cross-cultural differences," (Goldstone, 1998, p. 585), for example, Goldstone identifies four key mechanisms of perceptual learning that explain why experts have the ability to address a particular problem in a routine, automatic manner while novices are not sure where to begin. In short, experts efficiently and effectively process information by discerning patterns of pertinent structural and functional information, while sidestepping irrelevant stimuli. Learners become experts by optimizing attention focus, increasing discriminatory acuity, and economically evaluating multiple relations of features as single units, all of which reduce attentional load while increasing response time (Geller, 2011; Goldstone, 1998; Kellman et al., 2011).

It was once believed that what separated experts from novices was a lot of practice. Now studies using perceptual learning strategies in mathematics, computer science, and learning deficits, for example, indicate rapid and profound increases in learning. To illustrate, in repeated studies on algebra, struggling students who were taught pattern recognition for one week during the same time as other students received more traditional lessons on algebra not only outpaced the latter students in successfully completing equations upon return to regular class, but also indicated significantly deeper understanding of algebraic processes than their peers (Geller, 2011; Kellman et al., 2011).

It is currently accepted that perceptual learning is highly task specific (Geller, 2011; Wilcoxon, 2016). This may be because research studies uncovered thus far only focus upon very specific learning activities. A related surmise is that despite the variety of studies done on defining perceptual learning in different fields, Goldstone's (1998) work appears to be the solitary interdisciplinary effort to date. Moore (1967), Geller (2011) and Kellman et al. (2011) also note that much of perceptual learning occurs at a non-verbal level. These may be some reasons for why learning to identify, articulate, and enhance perceptual learning is not adequately addressed in the field of education (Kellman et al., 2011), even though neurology identifies the innate, perceptual nature of learning (Bower, 1966; Slater, 2002).

In spite of the aforementioned historical misconceptions and current scholarly limits that prevent its full employment in the traditional education system, though, perceptual learning may still come to prove its value in a connectivist world. The ability to discern meaningful patterns from immense quantities and varieties of digital data is an essential skill today. For example, engagement of perceptual learning strategies may offer a much-needed compass for navigating MOOC learning environments. Furthermore, perceptual learning strategies may help learners employ continuously-emerging technologies with greater confidence, ease, and thought. Yet, most importantly, the process of perceptual learning can offer profound insight not only into the holistic, integrated nature of how humans truly learn, but also into what motivates humankind to ceaselessly strive to be better individuals and a greater collective humanity (Emery, 1981; Goldstone, 1998; Moore, 1967).

Emotions, motivation, and learning.

The interdisciplinary discussion thus far on perceptual learning implies that cognition is inextricably bound to affective elements, such as emotion and motivation. Perhaps Vygotsky (1986) sums it up the best, “(Thought) is engendered by motivation, by our desires and needs, our interests and emotions. Behind every thought there is an affective-volitional tendency, which holds the answer to the last "why" in the analysis of thinking” (p. 252). For researchers such as Deci (1971, 1972), Deci and Ryan (2002), and Pink (2009), it is motivation that drives our desire to learn.

Ryan and Deci (2000a) define *motivation* as “*be*(ing) *moved* [emphasis in original] to do something” (p. 54). Part of their self-determined learning theory includes a taxonomy of motivation (2000b), which contains three distinct categories that are presented along a continuum. At one end is *amotivation* (that is, inertia, or no incentive or desire to do something). *Intrinsic motivation* (or “the inherent tendency to seek out novelty and challenges, to extend and exercise…capacities, to explore, and to learn”; 2000b, p. 70) is located at the other end. In between these extremes is *extrinsic motivation*, which is sub-divided into gradients from external regulation (such as external punishments or rewards) to integration (like recognizing congruency between external incentives and internal goals). Learners’ sense of autonomy, competency, and purpose (or “relatedness”) increases along this continuum as they experience greater intrinsic motivation. Self-determination theory posits that tasks promoting deeper intrinsic motivation yield greater and more lasting results in learning.

Researchers such as Douglass and Morris (2014) concur. Exploring extrinsic and intrinsic factors that motivate undergraduate students to achieve greatest academic success, Douglass and Morris found learning experiences that increase students’ sense of autonomy, competence, and relatedness motivate students to exert more determination and effort, resulting in greater academic success. In a similar study across numerous American colleges and programs, Guiffrida, Lynch, Wall, and Abel (2013) found a strong positive correlation between autonomy and competence versus learners' self-reported intention to persist in learning and GPA, but discovered a more nuanced relationship between relatedness, intention to persist, and GPA. Thus, it appears that when students are intrinsically motivated to succeed, they will perform better in high cognitive tasks (Douglas & Morris, 2014; Guiffrida et al., 2013; Pink, 2009).

It is affective learning outcomes that constitute the soft skills that employers find lacking in workers (Pierre & Oughton, 2007), especially in the high-tech industries (Cleveland-Innes & Ally, 2004).

One is left to wonder why, then, the affective side of human learning is shunned by mainstream academia (Kirk, 2007; Cleveland-Innes & Campbell, 2012). Cleveland-Innes and Campbell (2012) note that this scholarly neglect is particularly acute in the area of emotion and online learning. A few scholars suggest that the reason for overlooking affective constructs, such as attitudes, values, beliefs, opinions, interests, and motivation in educational literature is because these constructs are nebulous and therefore difficult to define, teach, and evaluate (Cleveland-Innes & Ally, 2004; Kirk, 2007; Kolballa, 2007; Krathwohl, 2002). Some critical theorists argue that, while this may be so, the primary reason is because emotion catalyzes change, which threatens the status quo (Callahan, 2004). Support for this latter view is found in the following section on transformative learning.

Transformative learning.

Transformative learning, or *perspective transformation* (Mezirow, 1981), involves the ability to consciously reflect upon and change one's habitual thoughts, behaviours, and the perspectives that govern these thoughts and behaviours. Mezirow outlines ten steps to this process: (1) a disorientating dilemma that creates discomfort between the existing perspective and an emotional experience, (2) critical reflectivity, (3) sense of alienation from previously accepted social practice and self-perceptions, (4) recognizing that this discord is shared by others, (5) exploring new role options, (6) gaining understanding and confidence in new roles, (7) action-planning, (8) acquiring knowledge and skills for action plans, (9) new role experimentation, and (10) reintegration into society based on a new perspective. It is imperative to note, however, that if one does not challenge their existing perspective, transformation cannot occur (Cranton, 1994, Robertson, 1997). (It is also crucial to differentiate between simple and transformative learning; Robertson, 1997. Transformative learning is experienced when a paradigmatic shift occurs in one's epistemology, causing a personal metamorphosis in assumptions, perspectives, thoughts, and behaviours. Simple learning, on the other hand, only broadens or deepens a learner's pre-existing worldview.)

Over the years, theorists have expanded Mezirow's work to address criticisms about his lineal presentation and over-emphasis on cognition in transformative learning (Boyd, 1991; Grabove, 1997; Robertson, 1997). For example, Baumgartner (2001) describes "transformational learning [as] a complex process involving thoughts and feelings" (p. 18). Dirkx (1998) identifies an extra-rational process of soul-based learning that occurs beyond the realm of rational and cognitive learning. Lastly Grabove (1997) notes that the transformative learner "moves in and out of the cognitive and the intuitive, of the rational and the imaginative, of the subjective and the objective, of the personal and the social" (p. 95).

Robertson's (1997) research findings suggest that educators who use transformative learning practices tend to focus solely upon sparking cognitive change in their learners because such educators do not fully grasp the transformative process. Acknowledging the often less than joyous, if not downright distressing emotional disturbances that catalyze metamorphosis (Brookfield, 1990), Roberson (1997) woefully reports that most educators are simply not equipped to facilitate this transition. One of many reasons for this educational shortcoming may include the need for scholars to redefine their conceptions of rational thinking as an agent of transformative learning.

The rational thinker.

A review of available literature identifies two distinct understandings of the term, *rational thinking.* The prevalent empiricist definition encompasses objectivity and fact-based cognition, while rejecting values and creative intuition (see for example, Rose, 2013). The purpose of such thinking is to determine how best to dominate and exploit the world. This project therefore borrows the critical theorists' label, *instrumental reasoning*, to identify this empiricist notion of rational thinking.

Kant's (1781/2013; 1784/1997) conception of rational thinking is one of a value-laden, moralistic, critically reflective process that evokes personal enlightenment and emancipatory action. Since this view of rational thinking involves the ability to see the imperfection or injustice of what is, imagine what could be, and to plan accordingly, it necessarily depends upon the dynamic interplay between the subjective and objective mind. Without emotions, without morality, there can be no rational thought (Vygotsky, 1986). Critical theorists, such as Adorno (1951/2005) concur, "Once the final emotional trace is effaced, what solely remains of thinking is absolute tautology (pg. 65)." It is this Kantian/critical theory conception that this dissertation adheres to when using the term, rational thinking.

Thus, for the purpose of this study, rational thinking is defined as a dynamic process involving the ability to: (1) discern one's perception of what is, (2) identify discordance between this perception and one's moral values, (3) imagine more harmonious possibilities, and (4) critically, pragmatically, and creatively determine what actions might best facilitate achievement of a better future. This process may be planned or unplanned. It may be lineal in nature, but is more likely to be spontaneous and chaotic because it involves the dynamic interplay between perceptions, cognition, and affect. As such, rational thought cannot be realized without engagement of the creative mind.

The creative mind.

This dissertation argues that rational thought, as defined from a Kantian/critical theory perspective, is irrevocably intertwined with the creative mind, for it is the imagination that enables one to contemplate new ways of perceiving, thinking, and acting. Without the ability to imagine new possibilities, transformation is inconceivable. Yet, “we cannot control creativity or bend it to our will” (Peat, 2000, p. 2). Nor can scholars capture it or even determine its borders, for it “escapes every definition” (Peat, 2000, p. 2).

Resisting any attempt to define creativity, Peat chooses instead to explore three aspects of it in his book, *The Blackwinged Night* (2000). The most commonly accepted notion assigned to creativity, he suggests, is “making something new, original, or unexpected” (p. 2). This is the novel invention, the epiphany, the “outside of the box” idea. A lesser recognized aspect of creativity is “renewing and sustaining what already exists” (p. 2). Examples include adapting, repurposing, revising, revitalizing, or recycling ideas and objects. The least recognized, but perhaps most vital aspect of creativity is “healing and making things whole” (p. 2). Individuals and social structures can fracture, crumble, or break. Rational thought and creative insight, as well as courage and tenacity, are required to identify, confront, and heal such maladies. Bureaucracies become rigid, people become apathetic, and economies fail without renewal. Healing may simply involve reorganization or restructuring. Or it may necessitate a complete break from what was and thus produce new autonomies (Peat, 2000).

This third aspect of creativity likely strikes greatest fear in the hearts of existing power moguls, for it is this kind of creativity that most challenges the status quo. Engineering dependent learners trained by external motivation to passively reflect knowledge transmitted down through an authoritative educational hierarchy means censoring uninhibited free thought and creative expression in learning, if this transmission model is to continue meeting the needs of dominant powers. It is of no surprise, then, to discover that it is those people who have yet to be indoctrinated by a discipline who offer the most profound contributions to that discipline. One need only consider Albert Einstein to recognize this truth, for his greatest contribution to physics occurred before he was “schooled” in that field. In fact, historical research proves that the more structured, rigid, dogmatic, and authoritarian a scientific or educational discipline is, the less creative its proponents are (Kuhn, 1962; Thompson & Brewster, 1978).

This phenomenon continues to exist today. In their book, *The Second Machine Age* (2014), Brynjolfsson and McAfee recount amazing stories in which individuals with little to no formal background in a discipline are able to solve problems that stump the greatest minds in that field. *Crowdsourcing* (or seeking labour, typically through the Internet, from outside one’s institution; Howe, 2006) innovations is becoming commonplace in many fields and organizations (Brynjolfsson &McAfee, 2014; Howe, 2006).

Tuthill and Ashton (1983) caution that, without scientific and educational institutional censorship and sanctions, creative innovations can cause havoc, and may even destroy the world. This assertion is debateable because the traditional education system does not foster rational thought (Bourne, 1917). For example, scientists and the American political elite *clearly lacked rationality* when they chose to risk the annihilation of the entire surface of the planet just to discover the potential of the atomic bomb. One is left to wonder what kind of world and humanity would exist if instead of being governed by the fear of losing control, scientific and educational institutions nurtured the natural human tendencies to realize individual and collective rational, creative potentials.

The natural learner.

The interdisciplinary picture that emerges on natural learning suggests that we, as humans, are hardwired from birth to satiate our unquenchable thirst for learning anywhere, anytime, and under almost any conditions. We are naturally curious, motivated, energetic, creative, perceptive, and autonomous learners. The ability to learn begins at birth; it is not language dependent, but rather perceptual in nature. We attach meaning to and organize unique perceptions of our external and internal worlds through the dynamic interplay of psychomotor, affective, and cognitive abilities, and the neurological structures and functions of our mind. Our needs and interests guide our learning paths. Through learning we strive to find purpose, mastery, autonomy, and innovation. In short, we seek to become more than what we are as individuals, as humanity, as members of this world.

The conclusion reached is that we, as learners, have the potential to be rational, creative, innovative, and wise. We need only the courage and tenacity to nurture the natural learner within and thus reclaim our power to learn. This, however, necessitates an epistemic break from the existing social order and the educational schema that reinforces it, as detailed in the following section on education.

Education

The prevalent schema of education holds that the development of human thought begins with humanity's slow cognitive ascent from mythology into religion, before being swiftly transformed by the radical, intellectual break of secular, scientific reasoning during the age of enlightenment. Critical theorists, such as Horkheimer and Adorno (1987/2002), challenge this assumption. The epistemological supremacy of fact, they argue, reduces thought to instrumental reasoning, and thus establishes a single order, a single way of viewing and relating to reality. This is mythology. It is not enlightenment; it cannot yield emancipation (Bourne, 1917; Emery, 1981; Horkheimer & Adorno, 1987/2002).

The myth of enlightenment through scientific fact pervades educational systems to this day. The systematic erosion of learners' confidence in their own knowledge and imagination, the subordination of emotion and creativity in education, and the psychological harm that these actions cause are deliberately designed to create a society rendered wholly dependent upon the powers that rule. The resounding success of this deliberate plan is exemplified by the two most valued purposes identified for pursuing education.

The purpose of education.

From socio-political and philosophical points of view, there are three major purposes for pursuing education in Western civilizations (Gros, 2016; Hamm, 1989; Keller, 2008). The first and most commonly cited purpose is economic productivity. The second is social cohesion and inclusion (Gros, 2016), which some scholars, such Hamm (1989), view as social and cultural indoctrination. Educational systems that value economic prosperity and social cohesion best serve those who govern society, for it is these elite few who profit the most in such systems (Bourne, 1917; Emery, 1981). The final, the least cited, but according to Hamm (1989), the highest, or most morally pure purpose of education is education for the sake of education; not only education for "personal development, fulfilment and expression" as Gros (2016, p. 16) sees it, but most tantamount, for personal and social transformation and emancipation (Freire, 1970/1993; Hamm, 1989).

Identifying who retains the power and control of the educational institutions, the curriculum, the mode of instruction, and the context in which learning takes place discloses what purposes a society strives to achieve through educational means. Thus, the aim of the following section is to consider who controls the power over learning in educational systems governed by traditional behavioural and learner-determined perceptual epistemologies, and what affect this has, or might have on individual learners and collective society. By using a critical pragmatic lens to expose institutional, curricular, instructional, and contextual factors of power and control manifested by these epistemic stances, it becomes evident which of the three primary purposes for education each position aims to serve.

Issues of power and control.

One needs to look no further than the United States to observe how the political powers that govern capitalistic society control the masses. At the turn of the 21st century, the US Federal Government issued a policy to only fund “rigorously scientific educational research” (as defined by politicians; Philips & Siegel, 2015) that could empirically establish cause and effect relationships in education. The results of such research would be used to develop practical, effective educational policies (Philips & Siegel, 2015). Adherence to the resultant “gold standard” of education was established by the Federal *No Child Left Behind Act* (NCLB; US Department of Education, 2001), which enforced educational accountability through standardized testing of politically-sanctioned curricula. State and Federal governments “imposed increasingly harsh punishments on schools that failed to make ‘adequate yearly progress’ on these tests” (Mulholland, 2015). By 2011, despite a decade of political interference and coercion, half of American schools failed to meet the gold standard (Mulholland, 2015).

The American educational dictatorship illustrated above is a polar opposite to an educational system based upon egalitarianism. Downes (2010) proposes four principles to guide the practice of equality in education. The first is *autonomy*. Such an educational system and its resources should be designed so that learners maintain the greatest control over their “own goals, purposes, objectives, or values” (Downes, 2010). The second principle is *diversity*. Rather than creating a system designed to create a homogenous humanity, equitable education should value and foster unique perspectives, experiences, and insights, and recognize that these contribute to the whole. *Openness* is the third principle. According to this principle, the system and its resources should maximize openness. Learners should have the freedom to enter and leave the system as they see fit. They should be encouraged to freely contribute ideas and artifacts, yet their right to privacy should be equally respected. Finally, the system and its resources should maximize opportunities for *interactivity*. This principle is derived from the belief that just as the individual can contribute to the knowledge of a learning community, the community can expand the individual's insights; this interaction yields a greater collective wisdom for society (Downes, 2010).

Freire (1970/1993) would likely add a fifth principle, *responsibility*. For, although Downes' conceptions of equitable education seem to reflect Freire's egalitarian notions of power, trust, freedom, and autonomy, a moral imperative in possessing power, trust, freedom, and autonomy is responsibility to oneself, to society, and to the world that humans lives in.

As detailed above, the fallacy of the current "Western democracy" is illustrated by the recent actions of an American government that imposed a rigid, homogenous educational system upon its people. Yet, as the standardized test scores indicate, this top-down coercive political and economic strategy is apparently failing, leading one to wonder if the locus of power and control in Western educational institutions is shifting. This possibility is investigated in the dissertation.

Institution.

Traditional educational institutions are tasked with distributing accumulated academic knowledge sanctified by the government of the day (Emery, 1981; US Department of Education, 2001). Canadian educational institutions are no exception, according to the Council of Ministers of Education in Canada (CMEC) website. By selecting who represents the public, students, and instructors on post-secondary institution boards, and by including input from business and industry, the CMEC appears to most value the first two purposes of education: economic prosperity and social cohesion/indoctrination.

To illustrate, a review of the Athabasca University (AU) Board of Governors Mandate and Roles Document (Office of the University Secretariat, 2014) expressly delineates the hierarchy of power and control that governs this institution. Every aspect of formal university life is dictated by Federal and Provincial legislation. It is the duty of the Alberta Minister of Innovation and Advanced Education to ensure that the AU Board of Governors translates legislation into daily institutional practice. The Minister selects the Board members, approves the AU mandate and purpose produced by the Board, and monitors the operations, performance, and business plans of the institution. Although two sentences in the nine-page document espouse values of accessibility, affordability, collaboration, and innovation, the rest of the paper is devoted to detailing the hierarchy of power and control governing this institution. The institution is held hostage, in part, by its economic reliance upon government funds.

In the 1960s and '70s, over 90% of Canadian post-secondary institutional funding came from government sources (Davison, 2015). By 2007, Canadian governments were contributing 61%, while students provided 22%, and private sources produced 17% of total institutional revenue (Statistics Canada, 2011). By 2013, the government contribution had dropped to 57% (Davison, 2015). This trend appears to be continuing (Adams, 2015). If Canadian institutions are vulnerable to capitalistic rules of consumer market (in other words, money equals power), increased student and private enterprise funding will increasingly affect not only the structure of leadership, operation, and curriculum at the post-secondary level (Keller, 2008), but the very survival of these institutions as well.

It is somewhat difficult to imagine the structure and function of a truly egalitarian post-secondary educational institution, as no such operational institutions have been discovered in reviewed literature. Nevertheless, drawing upon the literary research presented thus far and this researcher's life perspectives as an educator and learner, a tentative vision is offered here. The system would employ a distributed leadership bio-cluster network model (Wark, 2012; see also Avolio, Walumbwa, & Weber, 2009), designed to facilitate collaboration and networking in a transformative manner that manifests synergy and equality among all stakeholders. Decisions on governing bodies, mandates, and programs, as well as other operational policies and practices would require equitable dialogue (that borrows critical pragmatic stakeholder planning practices to avoid groupthink), rational thought, innovative ideas, and equal vote. Administrators, faculty, and students would share the freedoms and burdens associated with educational pursuits within the institution. The primary purpose of education would be to enhance personal and social transformation. In such an institution, theories, dialogues, and practices associated with learning would no longer dwell on how to produce more efficient and effective workers to feed the labour market, but instead focus upon developing systems that value and enhance individual, societal, and planetary health.

Curriculum.

The second controlling factor over learning considered herein is the curriculum. Broadly speaking, a *curriculum* consists of the means and resources used with learners to achieve certain learning outcomes (Ebert, Ebert, & Bentley, 2013). Within most educational settings, however, there are actually four curricula at play. The *explicit curriculum* blends the overtly-identified school mission with selected subjects to instill the knowledge and skills that successful students will acquire. The *implicit curriculum* involves indoctrinating learners with culturally-desired behaviours, attitudes, and expectations. The *null curriculum* consists of topics or perspectives deliberately excluded from learners' intended education. Finally, the *extra-curriculum* includes programs and activities that supplement the academic education (Ebert et al., 2013). Unless otherwise specified the term, curriculum, is meant in its broadest sense when used in this study.

In the traditional educational system, the government determines the overarching curriculum content and delivery (such as subjects, as well as major learning objectives and outcomes), while permitting the educational institution and its teachers some licence to do fine-tuning (such as selecting various learning activities and resources). Institutions and educators are tasked with ensuring that three general requirements are met. First, the implicit curriculum must program learners to distrust personal experience as a source of knowledge; accumulated "proven" academic knowledge is the sole source of true knowledge. Only educational institutions and their teachers can serve as trusted keepers and disseminators of this knowledge. Second, learners must be disciplined. They must learn what is taught when, where, how, and by whom the curriculum, institutions, and educators dictate. Third, learners must become literate (Emery, 1981). They must not only be able to read, but also to write, because "writing changes speech into a permanent visible artifact, a reality in its own right" (Olson, 1975, p. 370). As such, the written word provides "objective evidence" that learners can accurately regurgitate what is transmitted by the curriculum. Only those who have the ability to articulate the higher order abstractions and related logic of the set curriculum earn the authority to build upon, maintain, and control access to the knowledge structure of society. The rest learn that they cannot be scholars or scientists (Emery, 1981) and therefore must hold less status, power, and control in society.

Although the traditional explicit curriculum uses behavioural terminology such as "objectives" and "outcomes" to suggest that it is value-neutral, the implicit curriculum aims to eradicate independent thought, rational-emotive reflection, and creative expression, while fracturing and abstracting knowledge to a point where it bears little value for daily life. The null curriculum is equally damaging, for it teaches learners who and what should be ignored, devalued, and forgotten. The ultimate goal of such a curriculum is to habituate the proletariat to a life of submission to, and dependence on the social elite.

The goal of a learner-driven curriculum, on the other hand, is to help each learner realize the full potential of their natural learning abilities. Such a curriculum is likely based on an Individual Education Plan (IEP) that uniquely blends the learner's needs, interests, abilities, and desired goals with identified plans for developing the attitudes, skills, and knowledge required to achieve these goals. The IEP team consists of educators, other professionals, care-givers (such as parents), and the learner. As the learner becomes accustomed to planning and assessing learning needs, achievements, and goals, other members withdraw support, only contributing upon the learner's request. They become increasingly transient resources to the ever more self-aware, self-determined, and self-expressive, autonomous learner (Aviram & Assor, 2010).

The explicit learner-driven curriculum incorporates simple and transformative learning methods tailored to the individual learner. Embracing this age of technology-enabled information abundance, the new curriculum replaces the outdated traditional "just in case" knowledge transmission model with a more efficacious "as needed" version, in which the ability to find and evaluate the value of resources become essential. More crucially, though, this curriculum helps the learner to develop emotional, cognitive, reflective, and intuitive abilities, while identifying and challenging the learner's perceptions (Garnett & O'Beirne, 2013).

The term, extra curriculum, vanishes in a holistic, learner-determined paradigm, whereas the null curriculum transforms into that which is deemed irrelevant to the learning needs and goals of the learner in a particular learning situation. As such, the null curriculum is necessarily dynamic and indeterminate.

Finally, the implicit curriculum is driven by the belief that learners must possess the freedom and power to learn if they are to become autonomous, responsible learners. This is the hub of an egalitarian curriculum and an emancipated society (Freire, 1970/1993).

Instruction.

Instructional processes and resources translate curricular expectations into daily teaching and learning practice. In the traditional educational setting, teachers' values influence the government- and institutionally-driven curriculum through the instructional delivery methods and resources that teachers select. Often teachers are so instilled with the instructional process they learned by that they are unable to recognize or change their habituated beliefs, thoughts, or actions. Thus, generation after generation, such teachers unconsciously prepare their charges for a life ruled by an authoritative few (Brookfield, 1990; Heimlich & Nordland, 2002; Owens, 2013; Robertson, 1997).

Educators in a truly egalitarian educational system possess not only the ability to identify, challenge, and alter their own rigid, discriminatory perceptions, but also those of their students'. They are skilled in identifying and supporting the emotional and cognitive needs of their learners during this transformational process (Brookfield, 1990; Robertson, 1997). Furthermore, these educators are vigilantly reflexive in their educative practice. They accept their transient role in learners' lives, recognizing that their primary purpose is to supplement, rather than control, their students' learning journey. They reject the historic term "teacher," for this label can perpetuate traditional schema of the omnipotent teacher and the submissive, dependent learner. Instead, these educators acknowledge that learning is a life-long and life-wide journey for everyone; they, too, are "learners."

The shift from a teacher-centric to a learner-determined paradigm utterly disassembles the top-down hierarchal "one-size-fits-all" instructional approach to learning, replacing it with technology-enabled network learning (Garnett & O'Beirne, 2013; Hase & Kenyon, 2013; Siemens, 2005a, 2005b). The government-sanctioned curriculum no longer dictates instructional practice. Instead, the learner takes center stage in the learning process. The learner-driven IEP becomes the map that determines what curriculum, instructional processes, and resources (including resource people) each learner needs on their increasingly self-determined learning journey. The IEP guides the learner towards realizing their individual, natural learning potential. As such, the IEP is centered upon developing four intrinsic motivational drives: mastery (the "what and how" of learning), purpose (the "why" of learning), innovation (the "what if…" of learning), and autonomy (the "when, where, and who" of learning).

External rewards, such as letter grades and program certificates, are no longer ends by which to measure one's academic, economic, and social value, but rather mere external guideposts along one's autonomous, perpetual learning journey. Instead the learner, who inherently possesses the greatest insight into their own learning, evaluates personal successes and failures, and revises the IEP as needed.

The reflexive process in learner-determined instructional planning moves beyond *single loop learning* (or rule following), "in which a learner identifies a problem, takes action, produces an outcome and then begins again with a new problem" (Eberle, 2013, p. 145). Instead, it incorporates *double loop learning* (or rule changing), which enables a learner to detect and correct errors by challenging the underlying perceptions and values of their own and other people's habituated thinking, and to plan new courses of action (Argyris, 1977; Blaschke, 2013). By effectively employing double loop learning strategies, a learner is given the opportunity to sidestep social conformity engineered through traditional educational means (Argyris, 1977). Hailed as a cornerstone of heutagogy (Hase & Kenyon, 2001, 2013), double loop learning is viewed as an essential instructional strategy for surviving in the "rapidly changing and uncertain contexts" (Eberle, 2013, p. 110) of our day.

Context.

Sharples, Milrad, Arnedillo, and Vavoula (2009) describe *context* as a construct "that is continually created by people in interaction with other people, with their surroundings, and with everyday tools" (p. 4). Context, then, is more than simply a space or location; it is the dynamic interweaving of people, technologies, and their environment.

Vannini (2008) identifies three social analytical contexts where inequalities function: *macro* (distant, global contexts), *meso* (local community or organizational contexts), and *micro* (one-to-one interaction contexts). The meso domain mediates distant contexts and local interactions by using forms of *meta-power* (macro-level rules, laws, policies, or practices) to influence local interactions.

It is within the context of the meso domain that inequalities, such as "stigmatization, 'othering,' marginalization, alienating emotional labor, subordination, the formation of symbolic boundaries, the selective transmission of cultural and social capital, the regulation of discourse, the scripting of masses, and more" (Vannini, pp. 5-6), are reproduced to serve the needs of the social elite.

Legislative power, economic rein, and set curriculum are the meta-power forces that govern the collective learning experiences of the masses through the mediating contexts of the traditional educational institution and classroom. Great effort is put into regulating and containing the meso environment, from meting out the set curriculum, to sorting learners into time and space controlled sterile classroom settings containing uniform lessons, common resources, and habituated teachers. It is within this meso context where students learn that the dominant rule, the homogenous majority unquestionably follow the leader, and the different are outcast.

Conversely, the learning context is dynamic and unique to each learner in a learner-determined paradigm. Meta-powers and meso contexts of the traditional educational system are replaced with *personal learning environments* (PLEs) or *networks* (PLNs), which encompass the learner's holistic landscape and the technologies that the learner selects to facilitate learning within this landscape. The PLE supports lifelong incidental, informal, and formal learning. It promotes active learning by capturing, creating, curating, evaluating, adapting, and sharing information, while facilitating connection with oneself, other human and non-human resources, and the environment (Blaschke, 2013; Martindale & Dowdy, 2010). By engaging in transformative thinking and double loop learning, the learner not only retains power over their own dynamic learning contexts and lifelong learning path, but also has the ability to challenge the perceptions of others through their learning networks and to change reality.

Arguably, it is exceedingly difficult to employ learner-determined IEPs and PLEs within the time, space, and resource constricted, abstracted learning environment of the traditional formal brick-and-mortar school or campus. It is thus with great hope and optimism that those who seek to break free from the yoke of traditional education turn to the promise of distance learning.

The promise of distance education.

The first known educator to define theoretical aspects of *distance education* (DE), or “independent study,” as he called it, was Charles Wedemeyer (Garrison, 2000). An advocate for the learner’s freedom to choose, Wedemeyer envisioned DE as a “democratic social ideal” (Wedemeyer, 1971, p. 549) that offered equity and access to those who might otherwise be denied the chance to learn. Since independent learning focused upon individual, rather than group learning, it also provided the opportunity to personalize learning. Lesson delivery could be paced at learner convenience. More importantly, learning could be tailored to the learner’s self-determined activities and goals (Garrison, 2000). Sadly, Wedemeyer noted, the practice of independent study during his day was not living up to its potential because “the seeming rigidity of the format and materials apparently [deterred] teachers and students from more completely exercising their respective options” (Wedemeyer, 1971, p. 551).

Much has changed in the field of DE since Wedemeyer’s time. Perhaps the greatest advent has been the move to online and mobile learning initiatives. Nevertheless, until there is a collective shift in stakeholders’ traditional educational paradigms, the value of

DE as a vehicle for learner emancipation is tenable. One needs only to consider the intense energy expended on developing teacher-led synchronous virtual learning contexts, as detailed in the following chapter, to realize that stakeholders are using potentially emancipatory technologies to replicate the dingy classroom of the traditional, face-to-face (f-2-f) environment.

Summary

The main focus of this chapter has been to explore the theory, nature, and power of learning in available literature from a critical pragmatic perspective. To reveal the aims of any educational endeavour, critical pragmatists seek to answer three questions: (1) Who decides what should be taught and how it should be delivered? (2) According to what values? (Aviram & Assor, 2010), and (3) How does this shape society? Hence, this chapter has sought to unveil the underlying paradigms, values, and perspectives upon which the examined educational theories and practices are founded, and to illustrate how the values of those who possess the power over learning influence the political, social, cultural, and economic factors governing the destiny of humanity's worldly existence.

The theories, schema, and practices of two educational paradigms are contrasted to determine their value for achieving human emancipation. The conclusion reached is that the tenet of value-free objectivity, which gives the traditional empirical, behaviouristic paradigm its exalted authority, is a myth. By accepting the supremacy of scientific observation and fact humanity, as well as nature, is objectified, subjugated, and commodified. The false ideology of the behaviouristic paradigm enslaves learners through a formal education system governed by hierarchal power and control.

The traditional educational system maintains its power and control not only through indoctrination and academic certification, but through the enforcement of political policy and judicial laws, and a system of economic rewards and punishments. Despite these mechanisms of control, cracks in the façade of traditional education are appearing.

Governments and the social elite no longer possess the only keys to knowledge. Thanks to emergent technologies, learners are becoming active knowledge-creators, curators, and disseminators, rather than passive consumers. This shift in who controls the information and how it is used may be the harbinger of a new learner-empowered educational paradigm (Blaschke, 2013).

The central tenet of this learner-determined paradigm is premised upon the belief that the source of knowledge is human perceptions, not human senses. The connotations of a perceptual learning paradigm are profound. First, the meanings that human beings attach to their perceptions are unique to each person, so people possess individual worldviews. Second, not only are people innately capable of learning, but each person possesses individual power and control over their own learning. This implies that people are naturally competent learners. Lastly, life experiences can trigger emotional and cognitive incongruences that challenge people's perceptions, evoking rational, emotive, and creative reflection, which may lead to perceptual transformation. This means that rather than being static, predictable, and controllable, individuals (and their realities), are dynamic, unpredictable, and metamorphic.

Based on these premises, the praxis of a perceptual educational paradigm would include the reassignment of the locus of power and control over learning from the social elite to the individual learner. Natural, life-long and life-wide learning would form the basis of learner-driven IEPs and PLEs. The traditional educational hierarchy would be replaced with contextually-governed distributed leadership bio-cluster networks and PLNs. Knowledge transmission would occur on a just-in-time, as needed basis. Rigid adherence to objective facts would be replaced with the ability to identify, debate, and potentially change the underlying values that direct individual and collective thoughts and actions. Rational thinking, emotional wellbeing, and creative intuition would be nurtured, reflexivity encouraged, and transformative learning embraced. The primary purpose of such a system would be to empower each learner to become self-determined, autonomous, and thus, wholly emancipated.

DE and the technologies that enable it offer great hope for learner emancipation. Nevertheless, as the reviewed literature suggests, this requires a complete departure from the existing traditional educational paradigm for all stakeholders, *especially learners*. One is left to wonder, however, if online learners who have attained high levels of academic achievement via the traditional educational paradigm feel more empowered to learn through traditional means, if they possess the mindset of a learner-determined paradigm, or if they are in the midst of a paradigm shift. This musing forms the basis of the project. It also provides an introduction to the next chapter on technology-enhanced DE and the tools used to investigate some graduate level online learners' perceptions on who controls and who should control their learning, and how this affects their ability to acquire higher levels of emergent technology integration on demand.

Chapter III: DISTANCE EDUCATION–TECHNOLOGY-ENABLED LEARNING

The previous chapter on the theory, nature, and power of learning provides the backdrop for a deeper exploration of DE and the technologies that enable this form of learning. After presenting a brief overview of the history, nature, and various forms of DE, this chapter delves into the relationship between emerging technologies, formal and informal learning contexts, and DE. The paradigm shift model used for the study is then introduced. The final section of this chapter considers various technology integration frameworks and taxonomies before presenting the omni-tech technology integration taxonomy and the integrated paradigm shift framework designed for the research project.

Defining Distance Education

Moore and Kearsley (2012) define DE as “teaching and planned learning in which teaching normally occurs in a different place from learning, requiring communication through technologies as well as special institutional organization” (p. 2). Interaction in DE may be on a one-to-one basis between a tutor and a learner, or between two or more learners and instructors (Holmberg, 2005; Keegan, 1990). While these definitions include key notions of DE, they seem to subscribe to the traditional notion that at least one tutor and one learner must be engaged with each other through “planned learning” (Moore & Kearsley, 2012, p. 2). Siemens (2005a, 2005b) would likely argue that such definitions do not acknowledge the learning interaction between the learner and other human and non-human resources. Secondly, these definitions do not recognize that time, as well as place, can separate the learner from learning resources. Thus, for the purpose of this project, DE is defined by this researcher as “learning enabled by technologies that bridge separations of time and space between the learner(s) and human and non-human learning resources.”

Historically, interaction was initially facilitated through written correspondence via postal mail, which prevailed at least until the middle of the 20th century (Holmberg, 2005). The emergence of radio, telephony, and television during the same century enabled supplementary means of communication, with telephony offering two-way communication between tutor and learner (Holmberg, 2005). Advents in communication and artifact production technologies since the dawn of the 21st century sparked the introduction of new terms to define various modes of DE, which are employed inconsistently among scholars (Moore, Dickenson-Deane, & Galyen, 2011).

Online learning seems to be a broader term that may encompass *e-learning* (learning by means of stationary or "tethered" computers; Holmberg, 2005), distributed learning, network learning, and more (Ally, 2004). Recognizing the far-reaching nature of the term, online learning, Ally (2004) defines it as:

> (T)he use of the Internet to access learning materials; to interact with the content, instructor, 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. 4).

Mobile learning (or *m-learning*) is a term used to describe more recent forms of communication and artifact production via handheld mobile wireless devices, such as tablets and smart phones, which enable formal and informal nomadic learning (Ally, 2009; Holmberg, 2005). A third, and most recent term is *augmented reality* (AR; or the digital overlay of visual or audiovisual images onto real world objects). In DE, remote AR incorporates the use of multimedia communication by means of mobile and wearable technologies, such as AR eye glasses. Mobile learning and remote AR may be considered as modes of online learning since they typically involve the use of the Internet and web-based applications. These terms denote the media used to employ DE; they are not separate concepts from DE because they meet the two widely-accepted criteria that constitute DE (that is, geographic separation between tutor and learner, and use of communication media for learning; Holmberg, 2005).

The terms, DE and open learning, are sometimes used interchangeably. However, as Holmberg (2005) explains, DE is an instructional method whereas open learning is about “evading avoidable restrictions, for instance entry without prescribed entrance requirements” (p. 11). In Britain, the distinction between these terms is clouded because open learning institutions often incorporate DE practices (Holmberg, 2005). This contrast is further blurred by the increasing popularity of *blended, hybrid,* or *distributed* learning (the merger of f-2-f and DE to attain educational goals, made possible by emerging technologies that enable such practices; Bates, 2005; Norberg, Dzuiban & Moskal, 2011).

The Erosion of Time and Space

Certain scholars view DE as a part of the traditional educational discipline (Keegan, 1990). Others liken it to a poor cousin who threatens to commodify education and thus destroy the high quality and lofty standards of traditional schooling (Bates, 2005; Larreamendy-Joerns & Leinhardt, 2006; Parker, 2008). Conversely, some insist that DE is a distinct discipline with a unique epistemology, and its own theories and practices (Holmberg, 1986; Larreamendy-Joerns & Leinhardt, 2006; Sparkes, 1983).

According to Larreamendy-Joerns and Leinhardt (2006), a few scholars who support the notion that traditional f-2-f education offers superior learning experiences contend that the physical separation of time and space between the student, other students, and the teacher (or the “transactional distance”) is a primary flaw of DE. Such critics posit that higher order cognition, integral to a liberal education (that is, one of high formal academic standard) is achieved through discourse and interaction within a community of learners, an experience that until recently was not possible for DE students.

It is this transactional distance that one scholar believes identifies DE as theoretically and structurally distinct. Defining *transactional distance* as “a pedagogical phenomenon and… not simply a matter of geographic distance” (Moore & Kearsley, 2005, p. 223), Moore asserts that the greater the psychological and communication space is between an instructor and a learner, the larger the chance is for miscommunication. Building upon this assumption in his Theory of Transactional Distance (1993), Moore identifies three independent, yet interactive variables that affect transactional distance: instructional dialogue (or purposeful interaction leading to greater understanding), program structure, and learner autonomy.

In their review of academic literature on Moores' (1993) Theory of Transactional Distance, Gorsky and Caspi (2005) noted that while there was a plethora of philosophical and theoretical publications on the theory, only six empirical studies seemed to exist. Analysis of these research studies determined that three lacked reliability, construct validity, or both, while the rest produced data that only partially supported the theory. Some of these failures were attributed to the absence of operational definitions for the variables in Moore's work. Gorsky and Caspi surmised that the wealth of theoretical literature supporting Moore's theory was due to the logical and intuitive sense of Moore's rationale - as dialogue increases, transactional distance decreases. Yet, because it could be reduced to this single proposition, Gorsky and Caspi concluded that the theory was mere tautology. What DE educators needed instead, they argued, were theories that explained "what real dialogues look like, sound like, and how they work, or fail to work, in real situated learning environments" (p. 10).

Gorsky and Caspi (2005) note that one study operationalized the variable, dialogue, in terms of the number and frequency of interactions between instructors and students. Larreamendy-Joerns and Leinhardt (2005), like Gorsky and Caspi, warn that interaction does not indicate that dialogue has occurred. Larreamendy-Joerns and Leinhardt (2005) further caution that online courses assessing proof of learning by number and frequency of student interactions may revert to the authoritative teacher/dependent learner patterns of traditional education. Larreamendy-Joerns and Leinhardt (2006) conclude that, "If educators are going to engage in the practice of online education in a thoughtful fashion, then they need to understand two things: first, that online education has evolved from previous conceptions of education; and second, that there are social, political, economic, and ethical assumptions and implications in what appear to be simple actions of design and instruction (p. 567)."

Unfortunately, there is a growing international body of evidence indicating that traditional education dominates formal online (Collins & Halverson, 2009; Willams, Karousou, & Mackness, 2011) and mobile learning practices (Herrington, Herrington, Mantei, Olney, & Ferry, 2009; Ng'ambi, Gachago, Ivala, Bozalek, & Watters, 2012). Such evidence reinforces the view put forth in this dissertation: until there is a paradigm shift among the formal DE educational community (especially students), the emancipatory potential offered via emergent technologies that support transformational learning cannot be fully appreciated or realized.

Emerging Technologies and the Learning Context

Within any educational context, emergent technologies are not limited to new device hardware, software, and the means by which these tools enable communication (for example, the Internet and wireless connectivity). They also include old technologies that are used in new ways. Emerging technologies, however, are not just tools. They are also "concepts, innovations, and advancements [that are] utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33). This broader understanding of emergent technologies may help learners comprehend that it not what technologies they choose, or what the functions of these technologies are that matter most, but rather *how* and *why* learners use these technologies to learn, and *who* is involved in this learning equation. Learners can use emerging technologies to replicate and foster traditional educational contexts or to create and nurture new ways of understanding and interacting in the world.

Formal and informal learning contexts.

Whether the most powerful stakeholders in formal educational contexts accept it or not, emergent technologies are transforming the world of education. These technologies are blurring the lines not only between f-2-f and DE, but also formal and informal learning contexts, prompting a growing number of stakeholders to realize that education extends beyond schooling (Collins & Halverson, 2010).

The purveyor of traditional formal education is schooling, which "for most, only encompasses ages five to 18 or 21" (Collins & Halverson, 2010, p. 18). Nonetheless, even while in school, much of learners' education happens beyond the confines of the four-walled classroom. Education, then, is a lifelong, life-wide endeavour (Collins & Halverson, 2010).

The growing recognition in the value of non-formal education gained through workplace learning, self-study, informal DE, and such is prompting some higher educational f-2-f, DE, and blended learning institutes to change admission policies, allowing adult learners who do not have the formal prerequisites to enroll (Collins & Halverson, 2010). Prior learning assessment recognition (PLAR) evaluation processes award academic credit for formal education courses, programs, or degrees based upon the knowledge and skills learners have gained outside of formally-recognized institutions (Conrad, 2008).

Certificates are awarded for more job-specific training achievements by technical organizations and companies like Microsoft and Cisco (Collins & Halverson, 2010). Digital badges, open badges, and micro-certificates, used to mark small achievements, are similarly becoming popular in online education contexts, such as MOOCs (Friedman, 2014). Such certificates and badges, however, may be perceived as a threat to the existing traditional educational system because they undermine the credentialing monopoly of formal educational institutions (Jacobs, 2012). These certificates and badges also underscore how views on education are transforming, largely due to the emerging technologies that enable anywhere, just-in-time access to the knowledge, skills, and education that learners seek.

Nevertheless, translating the conception of education as a holistic system that blends formal and informal learning contexts into practical reality is a complex and multifaceted endeavour. Such a process requires rational thinking and creative innovations to avoid pitfalls that might yield unfortunate consequences for the learner and society. For example, if the government relinquishes control over public schools, these schools may evolve into dumping grounds for disenfranchised learners, while the dominant minority receives premium education elsewhere. Social cohesion, diversity, and broad worldviews may be threatened if learners become partisans of particular cultural groups who adhere to sectarian curricula, or if learners' educational interests become too narrowly focused (Collins & Halverson, 2010). An equitable balance between formal and informal learning curricula and contexts, then, is critical for developing responsible, egalitarian global citizens.

While the aforementioned concerns are not to be taken lightly, there are also substantive benefits to merging formal and informal learning contexts. For example, students are more actively engaged and self-determined when learning about topics that hold personal interest (Pink, 2009). Competition and failure devolve when learners no longer need to participate in a one-size-fits-all system that marks achievement by common letter grades. Through IEPs and PLNs, learning is customized for individual learning needs and goals. Learners who are no longer forced to fit the traditional educational model regain power and thus, responsibility over their own learning paths. Finally, peer cultures that value physical attributes, popularity, and illicit "fun" over intelligence and hard work lose control over learners who study in home, workplace, or learning center environments (Collins & Halverson, 2010).

While some educators may be reluctant to admit it, educational technologies are the driving force behind the transforming landscape of education. Technology-enabled formal and informal online learning opportunities empower learners to customize, contextualize, and control their learning experiences according to increasingly individualized needs, time/space parameters, interests, and goals. Emerging technologies also enable learners to connect to, interact with, and form PLNs that dynamically fuse learners' unique online and real world learning environments. In this holistic, lifelong and life-wide learning context, learning leaders play a crucial role in wisely and empathetically supporting and challenging the individual's ongoing learning journey (Collins & Halverson, 2010).

Omni-learning.

Wireless communication network systems are burgeoning across the globe. Mobile cellular subscriptions, for example, increased more than seven-fold from 2000 to 2015. There were over 7 billion cellular subscriptions in 2015 – nearly one for every person on the planet. Internet coverage also increased seven-fold - from 6.5% to 43% across the globe from 2000 to 2015. Worldwide, 3.2 billion people were using the Internet in 2015; of these, 2 billion were from developing countries (ITU Telecommunications Development Bureau, 2015).

At the present time, though, vast disparities in access still exist between developed and developing countries. Lack of access is particularly acute for non-urban dwellers and females in developing countries (Antonio & Tuffley, 2014; Bellman & Malhotra, 2016; Carlson & Gross, 2016; ITU, 2013; Hilbert, 2011, Linderman, 2015; Sow, 2014). Such phenomena indicate that emergent technologies currently tend to reinforce control of information by the economically, culturally, and geographically powerful (Hilbert, 2011; Landerman, 2015; Sow, 2014). These disparities must be addressed before equitable education can be realized on a global scale.

Nevertheless, if the spread of wireless communication systems across the globe continues, ICT technologies may soon provide nearly limitless access to information and learning networks wherever learners may be (Harsh & Sohail, 2002; Idiegbeyan-ose, Ilo, & Isiakpona, 2015). Thanks to the advances of emergent remote AR, even immediate, possibly urgent, step-by-step hands-on learning and training at a distance are possible (Ally & Wark, 2017; ScopeAR, 2017). Emergent technologies are transforming the world of education, offering access, communication, inclusion, and sharing on a hitherto unknown scale. In short, these technologies are rapidly creating a global context for omni-learning.

The term, *omni-learning*¸ appears to be coined by Auricchio and Kaganer (2015). Although they do not define the term, they do describe their vision of the omni-learning process, which entails the use of wearable and other digital technologies that monitor and record every aspect and moment of an employee's life (including health monitoring). The intelligent data system compares the data to a pre-established independent employee effectiveness improvement program. The system then provides ongoing feedback to the employer and employee on the employee's progress. Once a week or so, the employer reviews the progress report, sends the employee assessments, awards, incentives or warnings, and possibly alters the existing effectiveness progress plan for the employee. This conception of omni-learning as a process for improving employee workplace effectiveness is characteristic of the behavioural paradigm. It stands in stark contrast to the conception of omni-learning put forth in this dissertation.

For the purpose of this study, *omni-learning* is defined by the author as the ability to learn anywhere, anytime, with anyone, on demand, typically with the support of emerging technology. The omni-learning process envisioned herein is one in which emergent technologies enable learners to control their own learning paths; to learn when, where, how, why, and with whom they desire. As such, this conception of omni-learning fosters intrinsic motivation, promotes learner-empowerment, and thus subscribes to a learner-determined paradigm. Therefore, when the term, omni-learning, is used in this dissertation, it is this latter definition, conception, and epistemic view that are being espoused.

The omni-learning mindset is becoming critical during this turbulent transformational period where centuries-old nation-governed formal education contexts and information transmission technologies are rapidly being replaced by nearly borderless global learning contexts and perpetually-morphing emerging technologies. The problem that educational stakeholders, especially learners, face is determining what educational paradigm best supports learners’ capacity for omni-learning during this global transformation shift and the nebulous future beyond.

Since it is the learners who must flourish in this world of flux, it is imperative to capture their perceptions on what educational paradigm most empowers them to integrate emergent technologies on demand. A paradigm shift model is employed to encapsulate these perceptions.

The paradigm shift model.

Higher education instructional designers, Etmer and Newby (2007), assert that educators should adopt the educational paradigm that meets the needs of learners as they develop increasingly complex levels of knowledge. They propose a paradigm continuum that begins with behaviourism (to master rules, facts, and procedures of a profession), graduates to cognitivism (to extrapolate general rules of the profession for applying to particular problems), and then coalesces in constructivism (to develop new ideas and actions when familiar ones fail). While this may often be the case (Luckin et al., 2011; Tay & Hase, 2004), it is not necessarily always true (Garnett & O’Beirne, 2013; Hase & Kenyon, 2013).

Although subscription to a behavioural paradigm may result in a linear or hierarchal approach to learning, learning is actually a messy, complex process that does not adhere to such cut-and-dried sequential steps (Garnett & O’Beirne, 2013).

Nevertheless, traditional educational curriculum and practices may habituate educators and learners to believe that this is the only path to true knowledge.

The paradigm shift model (Figure 2) is designed to reflect the tenets of the perceptual learning paradigm. Thus, it is not a continuum, but a developmental model meant to map students' perceptions of institutional, curricular, instructional, and contextual factors that most empower them to learn as they progress through a course that emulates aspects of both paradigms.

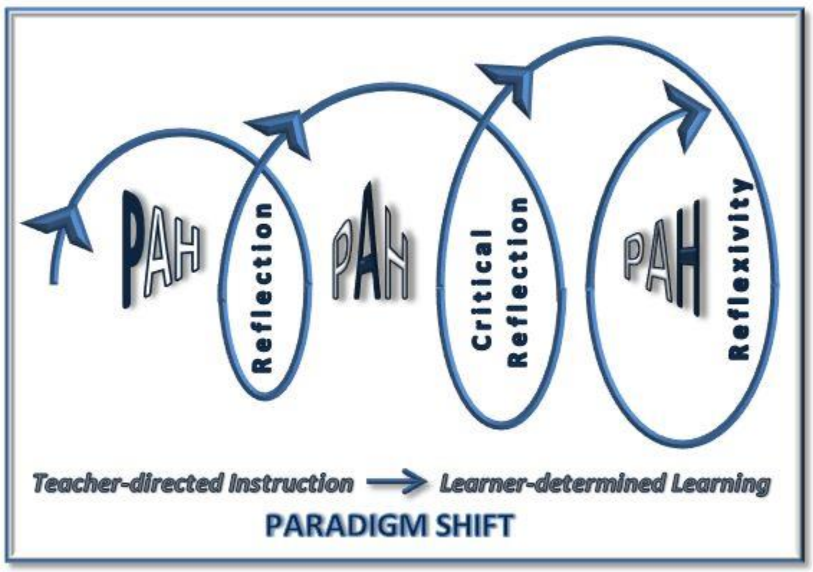


Figure 2. Paradigm shift model illustrating movement from teacher-directed to student-determined approach to learning. P indicates a pedagogical, A an andragogical, and H a heutagogical approach to learning.

The left coil in Figure 2 signifies a sensory-based behavioural/cognitive paradigm, characterized by traditional pedagogical theory and practice within the context of formal schooling. The central coil is indicative of a paradigm shift between the sense-based and perceptual learning paradigms. While this middle coil signifies a constructivist paradigm, it also retains some facets of behaviourism and cognitivism. Andragogical theory and practices prevail and the learning context expands beyond the formal class setting to incorporate professional learning communities and other educative resources. The right coil represents a perceptual-based, learner-determined connectivist paradigm.

Heutagogical theories and practices dominate. Although learners who adhere to this paradigm recognize and incorporate pedagogical and andragogical approaches to learning, they do so only where these approaches fulfill a purpose that they identify. The learning environment is the learners' holistic context; it may be global in nature.

Another aspect that helps to define which paradigm learners most closely identify with involves the type of reflective practice that they typically engage in. Although reflective thought is introduced in Chapter 1 as a cornerstone of critical pragmatism, this thread is now extended to clarify how various forms of reflective thought are defined in the paradigm shift model, as well as throughout the study.

Reflection, critical reflection, and reflexivity.

Controversy over the meaning and application of the terms reflection, critical reflection, and reflexivity abound in available literature. Lack of clear provisions for each term by their founders, coupled with differing theoretical perspectives, conflicting research, and varying practices between and within social science disciplines confound attempts to present universally-accepted definitions (Black & Plowfield, 2010; Brookfield, 2009; D'Cruz, 2007; Finlay, 2008; Rose, 2013; Smyth, 1992). An in-depth review of these terms is not undertaken here. Instead, each one is defined as used in the project.

Reflection is a thought process that involves reviewing an experience or practice in order to gain greater insight into what happened and why. It may occur before, during, or after an event. The primary aim of reflection is to increase efficiency and effectiveness of performance (Finlay, 2008; Schön, 1983, 1987; Smyth, 1992). Reflection holds small value for critical theorists, because it generates "relatively undisruptive changes in techniques or superficial thinking" (Fook, White, & Gardner, 2006, p. 9).

Critical reflection, on the other hand, involves individual analysis of the broader social and political powers that bring about and control existing behaviours and situations in light of new knowledge or experience (Fook et al., 2006; Rose, 2013). Once aware of the hidden assumptions unwittingly absorbed from social contexts, individuals become free to choose new ways of interacting with society. Discourse is often a vital component in the critical reflective process, for it can reveal the underlying beliefs of organizational networks and relationships that reinforce existing social power structures, while offering new perspectives and practices for the individual (Fook et al., 2006).

According to Smyth (1992), the difficulty with reflection and critical reflection as practiced in the field of education is that they do more to reinforce the elite's control than to emancipate learners. The aim of reflection (as defined above) is to ensure the ever-increasing efficiency of the economic machine. Critical reflection offers only false promise for individual autonomy and freedom, as individuals must continue to operate within the economic and political parameters defined by the State. Even worse, by promoting the practice of individual critical reflection, the powerful are able to neatly sidestep responsibility for injustice and other social malaise by reassigning the blame to the "autonomous" individual. What Smyth (1992) suggests instead is a more comprehensive, rational, and intuitive process of reflection, commonly known as *reflexivity*.

Reflexivity, simply put, is a marriage of reflective and critical reflective introspection of "self, praxis, and human nature" (Ryan, n.d.). It is an active, ongoing process that involves deconstructing praxis, systematically exposing theoretical and methodological presuppositions, challenging underlying epistemic beliefs and values, and reconstructing new ways to interact with and, thus, change the world (Freire, 1973/1997; Ryan, n.d.; Smyth, 1992). In this way, reflexive practice moves beyond speculation by understanding reality, recognizing injustice, overcoming existing social structures, and creating new realities by "reasserting the importance of learning" (Smyth, 1992, p. 300).

The practice of reflection, as defined above, is most closely aligned to a behavioural/pedagogical paradigm in the paradigm shift model. The heavy reliance on social discourse for critical reflective practice dovetails well with the constructivist/andragogical paradigm. The active, holistic, complex, and transformative nature of reflexivity, in turn, mirrors the tenets of a connectivist/heutagogical paradigm.

It must be noted, however, that the paradigmatic divisions in the paradigm shift model between reflection, critical reflection, and reflexivity are not static or exclusive. Learners who indicate a preference for the pedagogic approach are just as capable of reflexivity as those who prefer a heutagogical one. What the model does indicate is that pedagogical teaching practice fosters reflective, rather than reflexive, skills in learners. Thus, such learners are more likely to discuss the efficiency and effectiveness of educative practices than how such practices transform and empower learners.

Similarly, each paradigmatic loop does not constitute static, definitive boundaries within which only certain elements are located. For example, the leftmost coil in the model does not suggest that only pedagogical theories and practices are found here. Instead, the large “P,” mid-sized “A,” and smaller “H” implies that pedagogical theories and practices are most prevalent, andragogical ones are moderately present, and heutagogical ones are least likely to exist within the paradigm represented by this coil.

The directional arrows found on the coils represent how the current educational system is designed and where it may be going according to reviewed literature. At present, learners who are new to a discipline or field of practice tend to be funneled into pedagogical systems, while those who have achieved certain levels of certified accumulated knowledge move on to more andragogical learning contexts. Nevertheless, emerging technologies are disrupting this sequential educative process, perhaps transforming learners’ conceptions of who controls their learning, while empowering them to reclaim their natural learning process. Thus, the final loop in the coil represents a complete break from the old paradigm, the end of the paradigm shift, and the dawn of perceptual, learner-determined learning.

The paradigm shift model is the broad foundation upon which the omni-tech technology integration taxonomy is based. This taxonomy is introduced after other technology integration frameworks and taxonomies are critically assessed for their ability to address the aims of this project.

Technology Integration Frameworks, Models, and Taxonomies

A comprehensive review of various technology integration frameworks, models, and taxonomies is beyond the aims of this project. Nevertheless, a few that served as potential candidates for the study are reviewed in this section.

FRAME and BYOD models.

Koole's (2009, 2015) FRAME model is the inspiration behind the development of this project. Described by Koole as "a heuristic… a tool, like a lens, that allows someone to critically examine a given [technological] phenomena" (Koole, 2015), this model presents a rich, holistic, yet contextually dynamic structure for capturing and exploring mobile learning and work environments.

The FRAME model.

The FRAME model (Koole, 2009, 2015) consists of three aspects: Device (D), Learner (L), and Social (S). Expressed as a Venn diagram, each aspect overlaps with the other, creating intersects where they merge: Device Usability (DL), Social Technology (DS), Interaction Learning (LS), and Mobile Learning (DLS). These intertwining aspects and intersects are engulfed by a constantly evolving, hyper-dynamic information context. It is within this complex, fluxing milieu of aspects, intersects, and information context that mobile learning occurs (Koole, 2009, 2015).

The FRAME model (Koole, 2009, 2015) is gaining global popularity in academic and corporate communities as a promising means to fill the void between mobile learning pedagogy, learning theory, and practice (JISC Mobile Learning Guide, 2015; Stead, 2012). Yet, perhaps due to its recent inception, only four research projects using this model are known to date; two of which are currently unpublished.

Both published studies identify device usability, connectivity (such as limited, costly Internet access) and University interface problems (Kenny, Park, Van Neste-Kenny, Burton, & Meiers, 2009a, 2009b; Kumar, Biplab, Aggarwal, & Kannan, 2011). In the Kenny study, these vexations generate the conclusion that mobile learning, as defined by the FRAME model (Koole, 2009), cannot enhance interactive learning. Conversely, the Kumar study concludes that the FRAME model "bring(s) out the effectiveness of the intervention in terms of the device aspect, device usability intersection and interaction learning" (Kumar et al., 2011, p. 8).

Perhaps part of the reason why the two studies arrive at such different conclusions, despite sharing many other commonalities (Kenny et al., 2009a, 2009b; Kumar et al., 2011), is related to how the FRAME model (Koole, 2009) is interpreted and used by each team to extrapolate conclusions from findings. In short, it is possible that each team interprets the model differently. Operationalizing the FRAME model for research purposes uncovers overlaps, missing elements, inconsistencies, and ambiguities in the model (Ally, Cleveland-Innes, & Wark, n.d.). Problems include: (1) apparent lack of theoretical cohesion between conceptual and descriptive elements, (2) vague, missing, or contradictory definitions, and (3) confusing use of nomenclature. Koole (2015) is addressing some of these issues and providing an example of how the model is used within a specific context in a forthcoming publication.

As presented to date, however, the FRAME model appears to reflect a quasi-learner-centric paradigm that includes increased learner autonomy, as well as formal, informal, and lifelong learning. Nevertheless, while Koole (2009) identifies social, environmental, and technological factors of the DLS intersect, as well as psychological, emotional, and motivational factors of the DL intersect and L aspect, the bulk of her published writing focuses on development of the learner's cognitive abilities.

The BYOD model.

The BYOD model (Stead, 2012) is a near replica of the FRAME model (Koole, 2009), adapted for use in the mobile workplace. It provides a framework for decreasing cost, while increasing the efficiency and effectiveness of mobile technology integration for industries, organizations, and corporations by having workers use personal mobile devices for work purposes. The BYOD model clears up some of the confusion in the FRAME model by reorganizing and clarifying some FRAME descriptors, but overall the models are the same. As such, the criticism regarding the primary focus upon developing learners' cognitive abilities via the FRAME model applies equally to the BOYD model. There are no known research studies to date that test the BOYD model (Stead, personal communication, March, 2015).

Padagogy Wheel V4.0.

The Padagogy Wheel V4.0 (Carrington, 2015) melds motivation (Pink, 2009), Bloom's cognitive domain, mobile apps, and the Substitution, Amplification, Modification, and Redefinition (SAMR; Puenterdura, 2006, 2013; detailed below) model into a mobile learner-centred pedagogy aimed at attaining 21st century graduate attributes (Carrington, 2015). While not as expansive as the FRAME model (for example, the Padagogy Wheel is void of informational contexts), the goals behind the Padagogy Wheel are more conducive with a perceptual learning paradigm. In short, the aim of the Padagogy Wheel is to enhance technology integration, motivate and transform students, increase their autonomy, mastery, and purpose, and thus enable them to achieve 21st century graduate outcomes.

The Padagogy Wheel is rapidly gaining popularity. It is now translated into 19 different languages and over 100,000 copies of the poster have been downloaded worldwide (Carrington, 2015). To Carrington's knowledge, most people using his poster are educators. He is unaware of anyone studying it for educational research purposes (personal communication, April 23, 2015).

In reviewing Carrington's poster and blog postings to date (Carrington, 2015), though, readers may be left to wonder just how 21st century attributes, motivation, cognition, mobile apps, and technology integration interrelate. For example, the center of the wheel-shaped poster instructs one to "Start at Core," where "21st century attributes and capabilities" are found. If these instructions are taken literally, Pink's (2009) internal student motivation, located on the closest ring surrounding this core, appears to be fuelled by externally-imposed institutional and societal measures. Carrington (2015) plans on publishing a number of lessons incorporating the use of his poster, which may assist in understanding how the poster is meant to be interpreted for educational practice.

Technology integration taxonomies.

The FRAME, BYOD, and Padagogy Wheel V4.0 provide a wide angle view that blends theory with practice and, in doing so, marries various individual, technological, and social attributes of mobile learning. The SAMR taxonomy (Puenterdura, 2006, 2013) and the Replacement, Amplification, and Transformation (the RAT; Hughes, Thomas, & Scharber, 2006), and RATL (Hesselbein, 2014) frameworks, however, are more narrowly focused upon generic technology integration for specific tasks or situations.

SAMR.

The SAMR model (Puenterdura, 2006, 2013) is a hierarchal taxonomy of technological adoption. The lowest level, *Substitution,* describes situations in which a technology is being used exactly like another technology would be used (such as a computer used as a typewriter). The next level, *Augmentation,* describes a tool being used as a substitute, but with some kind of improvement in function (like using cut and paste options on the computer). Movement from the first to the second level is viewed as *Enhancement.* The third level, *Modification,* includes technological use that enables redesigning of previous tasks (for example, inserting video clips and images into a Word document). The final and highest level is *Redefinition*, which describes technologies that enable the creation of new tasks that were hitherto impossible (such as integrating content management software for online learning). Movement from Modification to Redefinition constitutes *Transformation* (Puenterdura, 2006).

Since its inception in 2000, the SAMR model has become increasingly popular among corporations and educators alike. Nonetheless, the validity of this model is questioned (see for example Hesselbein, 2014; Linderoth, 2013; Love, 2015; O'Hagan, 2015); no academic publications, peer-reviewed articles, or scientific research publications by Puenterdura or other scholars are known to exist.

RAT(L).

The second hierarchal example, the RAT framework (Hughes et al., 2006), is conceptually similar to the SAMR model, although some scholars claim that it is less complex, easier to interpret, and thus more practical to use (Hesselbein, 2014; McHugh, 2014). The lowest RAT level is *Replacement*, which includes technology that leads to the same instructional end as previously-used technology. The middle level is *Amplification*, where a new technology increases efficiency, without fundamentally altering a given task or situation. The highest level, *Transformation*, includes technologies that enable previously inconceivable forms of instruction and learning to occur (Hughes et al., 2006).

Hesselbein (2014) subsequently added one higher level, *Leadership*, to the RAT model, which he renamed the "RATL model," arguing that the new level exemplified educators who help others use a technology in transformative ways.

The SAMR taxonomy and the RAT and RATL frameworks possess a teacher-centric focus, causing theoretical and conceptual misalignment with the learner-determined paradigm underpinning this research project. Thus, a new taxonomy is presented to address this, as well as other previously identified issues.

Omni-tech.

The omni-tech taxonomy (Figure 3) is designed specifically to work in unison with the paradigm shift model for identifying context-specific paradigmatic elements. Starting on the left of this graphic, a predominately behavioural/pedagogical learning environment has a curriculum and instructional processes that focus primarily upon the acquisition and practice of instrumental reasoning required to help the learner integrate emerging technologies into school activities and tasks. Within the shifting/andragogical context, increased practice in learning and work environments, coupled with exposure to a wider range of experts, enable the learner to gain technological competence. While instrumental reasoning remains valued in this environment, some critical thinking may occur. In the perceptual/heutagogical paradigm, knowledge and skill acquisition, practice, competency, and capacity are dynamically intertwined, enabling the learner to access information from a host of human and non-human resources, practice what is being learned, master this learning, and use the emergent technology in innovative manners on an omni-learning basis. Instrumental reasoning, rational thought, and creative intuition are employed when needed. The transformative learner of this paradigm models leadership by actively engaging in their learning, learning from and with others, and sharing what they have learned. The paradigm shift occurs when the pedagogical or andragogical learner realizes that they alone control their individual learning path and move into the heutagogical realm that characterizes natural learning.

Figure 3. Omni-tech taxonomy. Illustrates various levels of technology integration anticipated in relation to a behavioral/pedagogical (left column), shifting/andragogical (middle column), and learner-determined/ heutagogical (right column) educational paradigms.

Figure 4 provides an expanded view of the Transformative Learning and Leading category in the omni-tech taxonomy. A learner's emergent technology integration perceptions and experiences dynamically influence each other through reflexivity and by innate drives to find purpose, achieve mastery, gain autonomy, and innovate within the learner's natural, holistic omni-learning context. The learning process engages instrumental reasoning, rational thought, and creative intuition on demand. These mental processes not only help the learner to interpret experiences, but when used reflexively, may transform perceptions, alter experiences, and change reality, while enhancing intrinsic motivation to achieve higher levels of purpose, mastery, autonomy, and innovation.

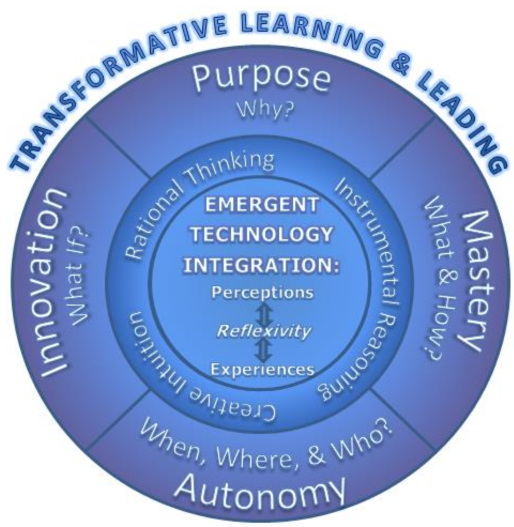


Figure 4: Integrating emergent technology naturally. A learner's emergent technology integration perceptions and experiences dynamically influence each other through reflexivity and by innate drives to find purpose, achieve mastery, gain autonomy, and innovate within in the learner's natural, holistic omni-learning context. The learning process engages instrumental reasoning, rational thought, and creative intuition to help the learner interpret experiences and reflexively transform perceptions, while enhancing intrinsic drives.

Every learner possesses unique, dynamic levels of intrinsic drive to integrate each emergent technology encountered. To illustrate, one individual may have a great desire to master any new technology that comes along simply for the challenge of mastery, another may see mastery as a means to an economic end, and a third may be equally motivated by both desires. By understanding a learner's perceptions of and experiences with integrating emergent technologies, learning leaders can help the learner to clarify: (1) why integration is important to the learner, (2) what needs to be learned, (3) how to use the technology, (4) when and where the technology may help, and (5) who should be included in the learning equation; as well as to consider novel opportunities or solutions that the technology might offer.

While the learner may initially identify extrinsic motivations, the learning leader's goal is to first encourage the learner to challenge the necessity and value of integrating the emergent technology, and then if the learner determines that these reasons justify the purpose for integration, help the learner identify and experience greater intrinsic motivations for integrating the technology. By facilitating the practice of this exercise, the learning leader assists the learner in fostering instrumental reasoning, rational thinking, and creative intuition. This process helps to promote reflexivity, transform perceptions, and change reality not only for the learner, but perhaps for the learning leader as well.

The paradigm shift/omni-tech framework.

The omni-tech taxonomy and paradigm shift model are employed together for the project. The resultant framework (Figure 5) suggests that typical behavioural-based traditional formal schooling consists of a teacher-controlled environment in which a pedagogical approach is taken to help learners acquire and then practice emergent technology integration. Lessons focus upon how to use the technology and thus foster development of instrumental reasoning and reflection. The shifting paradigm/ andragogical environment is less teacher-directed. Academically-recognized experts, as well as learning and practitioner communities become part of the learner's resource system. The learner gains more autonomy over the learning process, although the institution and instructor still retain primary control (such as control over the academic calendar, admission requirements, and formal assessment). The formal educative process focuses upon the transition between practicing and attaining competency with emergent technology integration. Formal class time is rarely devoted to pedagogical technology lessons. Instead the technology is viewed simply as a vehicle to engage in other, more lofty pursuits. By practicing use of the technology to interact with a broader community of experts, practitioners, and learners, the learner is given opportunity to discover how others are employing it. Eventually practice leads to competency within this environment. This exposure helps the learner move beyond instrumental reasoning to rational thought and critical reflection (for example, "Why am I using this tool?").

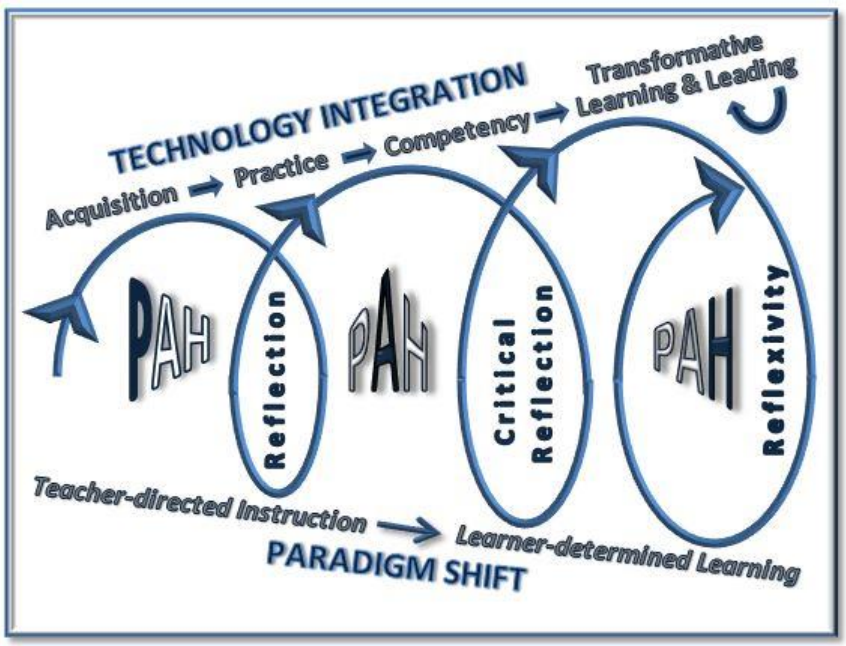


Figure 5. Paradigm Shift Framework, illustrating merger of paradigm shift model and omni-tech taxonomy.

Lastly, the transformative learning and leading state of the learner-determined/ heutagogical environment is characterized by flux. As such, acquisition, practice, competency, and capability are fluid and interwoven with the learner's goals to achieve purpose, mastery, autonomy, and innovation. To illustrate, while actively engaged in using an emergent technology in an innovative manner, a learner may discover a need to acquire some new knowledge or skill. Rather than stop everything to go through the traditional steps of acquisition, practice, and competency, the learner picks up what is needed “on-the-go” while continuing to actively innovate. Similarly, instrumental reasoning, rational thinking, and innovative intuition are accessed as required while the learner reflexively integrates emerging technology on demand. Learners who model this form and process of emergent technology integration not only achieve personal autonomy, but lead by example.

Summary

The central point made in this chapter is that emergent technology is changing where, when, why, and how people learn, as well as who and what learners view as legitimate sources of knowledge. This, in turn, questions why learners need to conform to traditional formal schooling policies and practices in order to achieve their learning goals. If the assertion made by scholars like Freire (1973/1997) and Pink (2009) that learners are innately driven to be self-empowered and autonomous beings is accepted, then it is impossible to see the emergent technologies that allow learners to take control over their own learning paths as anything less than transformative, emancipatory technologies. Yet, as reviewed literature indicates, until there is a paradigm shift among the formal DE educational community, *especially students*, these technologies will continue to be used to enslave, rather than to emancipate learners in DE learning contexts.

New perceptual/heutagogical frameworks, models, and taxonomies can assist learners and learning leaders in identifying and adopting a learner-determined emergent technology integration paradigm. One element missing from all technology integration frameworks, models, and taxonomies reviewed in this chapter - except the omni-tech model - is morality. Although the Padagogy Wheel V4.0 may possess implicit notions of morality in its reference to 21st century graduate attributes and capabilities and Pink’s (2009) motivational drives, the bulk of the poster concentrates upon Bloom et al.’s (1956) cognitive taxonomy, mobile apps, and the SAMR technology adoption taxonomy. The dissertation asserts that a key tenet of a learner-determined emergent technology integration model must be reflexivity. Reflexivity means: (1) challenging one's own as well as others' moral reasons for integrating or not integrating an emerging technology, and (2) having the imagination, courage, and other means to transform reality. As such, reflexivity is critical in helping learners discover and realize technology-enabled emancipation.

Further conclusions derived from the review and critique of other scholars' technology integration models are that: (1) every aspect of the model and taxonomy must be clearly defined and operationalized, and (2) every effort must be made by the researcher to expose the model and framework to academic scrutiny and field research. This dissertation, including the following chapter on the research methodology for this project offers a preliminary step for addressing such aims.

Chapter IV: METHODOLOGY

The preceding chapters provide the theoretical, conceptual, and substantive framework within which the study aims to address the critical issue on how best to empower learners to integrate unpredictable, perpetually emerging technologies for learning on demand. This chapter ties theory to praxis by presenting the research questions, methodology, methods, study context, data collection procedures and instruments, and timeline used to investigate the problem at hand, while explaining what epistemic, theoretical, and conceptual reasons underlie the practical choices made for conducting the study. Ethical issues of the research are then considered before an overview of subsequent dissertation chapters is given and final conclusions are drawn. The chapter begins with a brief restatement of the purpose for, and theory behind the study, followed by a review of the research questions chosen to explore the identified emergent technology integration dilemma from the learners' perspectives.

Purpose Restated

The main purpose of this study was to determine what key institutional, curricular, instructional, and contextual factors, and ultimately, what learning paradigm students believe most empowers them to integrate emerging technologies for learning on demand. By using the obscure critical pragmatic research paradigm (Ulrich, 2007a) and a transformative mixed methods methodology to capture and explore the situation from the learners' point of view, new insights into theories and practices relating to this problem are discovered and shared, prompting fresh dialogue on the nature, theory, power, and practice of learning, and the integration of emergent technologies for learning on demand.

Although an in-depth presentation of the critical pragmatic research paradigm chosen to fulfill the purpose above has been undertaken in Chapter 1, a brief summary of this paradigm ensues. The intention herein is to illustrate how the research methodology, method, and praxis, like all other facets of the study, are bound to and guided by the critical pragmatic paradigm.

Critical Pragmatic Research Paradigm Revisited

Critical pragmatism is “a theory of science that emphasizes the need to apply knowledge to everyday problems based on radical interpretations of liberal and progressive values” (Deegan, 1988, p. 26). Critical pragmatism endorses the notion of a socially-conceived reality, rejects the idea of universal truths, and strives to expose false ideologies. In brief, critical pragmatism embraces the emancipatory, transformative potential of social theory, pragmatism, and research (Ulrich, 2007a; Vannini, 2008).

Three methodological cornerstones constitute the foundation of the critical pragmatic research paradigm: critical theory, pragmatic thought, and reflective practice (Ulrich, 2007b). Critical pragmatism merges these three in a manner that capitalizes on their individual strengths, while mitigating their weaknesses. In short, critical pragmatism pragmatizes reason for critical theory, operationalizes holism in pragmatic thought, and develops the critical heuristics “of rationality, truth, and ethics” (Ulrich, 2007b) for reflective practice.

Critical pragmatists integrate philosophy and social sciences to facilitate normative analysis, explanation, and forecast. They use empirical, rather than conceptual analysis to develop normative theory. Their research is situated within social, historical, political, and other contexts (Bergstrom, 2000; Cohen et al., 2011; Creswell, 2003; Frega, 2014; Lather, 2006; Midtgarden, 2012; Perry, 1929). Their work accentuates the importance of developing rational thought and reflection (Ulrich, 2007b). They use their research to analyze and change contexts, outcomes, rationality, power, and ethics (Zack, 2008) and, in doing so, promote equality. They recognize and strive to improve the emancipatory and equitable potential of education and the technologies that enable it (Cohen et al., 2011; Creswell, 2003; Zack, 2008). Finally, as individuals, critical pragmatic researchers aim to be reflexive, ethical, polemical, and activist citizen scholars (Ulrich, 2007a; Vannini, 2008).

This brief summary of salient tenets, methodological foundations, study contexts, and aims that define critical pragmatic research provides a reference point against which to assess the selection of each element included in the research design. As such, the following research questions illustrate the social, political, and contextual nature of the study, as well as the desire to explore learner empowerment from the perspective of learners.

Research Questions

The research project seeks to reflect the learners' perceptions through their voices. The primary question asked is, "*What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?"* More specifically:

1. What are the key institutional, curricular, instructional, and other contextual factors that empower the learners in this study to integrate emergent technologies for learning on demand? Will these perceptions change as they progress through the course?
2. Is there a difference in technology integration levels between the learners in the study who identify a preference for a traditional teacher-directed learning paradigm or a learner-determined one, or who appear to be in the midst of a paradigm shift? If so, what key learner-identified factors are most likely associated with the reported differences?
3. Is there a difference in the amount of scaffolding and learning curve reported by the learners in the study who identify a preference for a traditional teacher-directed learning paradigm or a learner-determined one, or who appear to be in the midst of a paradigm shift? If so, what key learner-identified factors are most likely associated with the reported differences?

A transformative mixed methods methodology was chosen to translate the epistemic, theoretical, and conceptual research foundations into research practice. An overview of this methodology in the following section begins by defining key terms.

Methodology: Transformative Mixed Methods

Scholars have differing conceptions of what the term, *methodology*, means. Somekh and Lewin (2005) describe methodology as a collection of rules or methods guiding a particular research endeavour, or as the "principles, theories and values that underpin a particular approach to research" (p. 346). Walters (2006) contends that methodology is the framework by which researchers translate their paradigms or theoretical perspectives into research practice. Mackenzie and Knipe (2006) concur with Walters, stating that the most common definitions indicate that methodology is the overarching research approach used to link paradigms, theories, and research methods, while "*method* refers to systematic modes, procedures or tools used for collection and analysis of data [emphasis in original]." Mackenzie and Knipe's (2006) elucidations are adopted here.

Recognized by some as the third research paradigm (Denscombe, 2008; Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2009), *mixed methods* research blends the traditional empiricist research methods of normative positivism with the subjective, qualitative research methods of interpretivist, humanistic social science to provide a thick, rich picture that yields more insightful interpretations of the dynamic relationships between and among the phenomena being studied (Cohen et al., 2011; Greene, 2007). Exploratory and confirmatory in nature, mixed methods "balance[s] the philosophical, conceptual, practical, and political considerations" (Greene & Caracelli, 2003, p. 108) of research inquiry.

While many scholars suggest that mixed methods methodology is most conducive to a pragmatic paradigm (Cohen et al., 2011; Johnson, Onwuegbuzie, & Turner, 2007; Maxcy, 2003; Onwuegbuzie & Leech, 2007; Teddlie & Tashakkori, 2009), others argue that because a central aim of mixed methods research is equality and social justice, it belongs within a transformative paradigm (Greene, 2008; Mertens, 2007, 2009, 2012). The dialogue herein does not aim to resolve this issue, but instead moves on to introducing the transformative mixed methods approach for this study, since this form of mixed methods approach appears best suited to facilitate the goals of this project.

Transformative research (also known as transformational, emancipatory, or resistance research) is described as being "subjective, relational, collaborative, interpretive, and performative" (Finley, 2008, p. 887) in nature. It serves two purposes: (1) to revise habitual thinking, political and social beliefs, and stereotypes, and (2) to improve practice. Transformative research is theory and praxis-driven. It actively engages the dynamic relationship between knowing and doing; reflexivity and action. The strength of transformative research is in its ability to use creative intuition and social frameworks to break down social power structures of oppression and inspire emancipatory social change (Finley, 2008). Of the six transformative mixed methods research designs identified by Mertens (2015), the one chosen for this study was "transformative design" (p. 72).

Transformative design.

Theory directs the study in transformative design research, guiding the purpose, research questions, data collection, and outcomes of the project (Creswell, 2012). Methods that best serve researchers' theoretical perspectives are purposely selected (Creswell, Plano, Clark, Gutman, & Hanson, 2003; Mertens, 2015). "All other decisions (interaction, priority, timing, and mixing) are made within the context of the transformative framework" (Mertens, 2015, p. 72). A key measure of a good transformative design is the call for change or reform as a result of the research undertaken in a project (Creswell, 2012). As such, this design seems to be an ideal framework for translating the aims of this critical pragmatic study into a practical, normative research project.

Population and sampling.

The target research population were adult learners who were learning how to integrate emergent technologies for learning on demand. One conclusion reached in

Chapter 2 was that children were naturally-empowered learners until traditional schooling took over. Since learners who followed the formal education path supposedly regained increasing control over their own learning as they attained higher levels of adult education, it was these adult learners that the study focused upon. A purposive sample of online graduate learners from a North American online university was chosen for the study from the larger target population described above. These learners typically worked within the field of education, which means that they were in a unique position to consider and employ various emergent technology integration theories, models, and practices as learners and educators. The specific recruits came from two four-month long courses offered at the university. The two courses were chosen due to their blended paradigmatic structure, and their focus upon theoretical as well as practical implementation of emergent technologies for teaching and learning. (It was recognized that the two courses were not synonymous with each other in some ways and that differences needed to be taken into account during data analyses. The decision to include both courses, though, was based upon the need to recruit an adequate number of respondents for the study.) All learners enrolled in these courses were invited to join the study shortly before the academic term officially started. The course instructors were also invited to join the study as learning leaders, since the notion of natural learning and tenets of heutagogy also recognize them as learners (Anderson & Wark, 2004; Hase & Kenyon, 2013).

Due to the nature of the critical pragmatic paradigm and the small sample size, the results of this study are not to be generalized beyond learners and study contexts that share similar characteristics (Castro, Kellison, Boyd, & Kopak, 2010; Cohen, Manion, & Morrison, 2011). Further discussion on generalizability of study findings is found in the "Assumptions, Limitations, and Delimitations" section of Chapter 7.

Pilot study.

A pilot test preceded the research study. Six student volunteers from similar online class environments at the same institution completed the online pre- and post-course questionnaires and the mid- and post-course telephone interview instruments. These volunteers provided feedback on the instruments and research processes upon completion of all instruments. The researcher also recorded observations and reflections in the ongoing research journal kept for this dissertation project. The purpose for the pilot study was to test and validate the data collection instruments, and data collection and analyses processes before using them in the actual study by addressing any potential technical, procedural, or presentation layout issues, clarifying ambiguities, confirming timing, and establishing applicability, consistency, neutrality, and dependability (Cohen et al., 2011).

Data collection.

Details on the procedure and instruments used to collect and analyze the project data are broken into two sub-sections below. This information is summarized in Figure 6.

Procedure and timeline.

The research process for this project took one year to complete. The first step was to obtain appropriate permissions. This process was executed in the following sequence: (1) submit the Student Application to Conduct Research to the University Research Ethics Board (REB) for approval, (2) obtain VP of Academic Institutional approval, (3) email a *Department Head Letter of Information* (Appendix A) to the University Department Head, and (4) email an *Instructor Letter of Information* (Appendix B) and *Instructor Consent Form* (Appendix C) to the instructors for the Winter 2017 pilot study and the Spring 2017 courses. These steps took approximately one month, whereupon the pilot study began.

The pilot study took place in the Winter 2017 term. Upon completion of the pilot study process, review of respondent feedback resulting in minor logistical adjustments, and testing of the data analyses processes, recruitment of potential student participants for the research study began.

Data collection for the research study in the two Spring 2017 courses took five months. Recruitment began two weeks before the courses officially start, using the

Student Recruitment Email (Appendix D). From a total possible respondent pool of 34 students, seven recruits from one course and five recruits from the second course completed all instruments. Once potential respondents confirmed their interest in participating in the study, the link to the *Online Participant Consent Form* (Appendix E) and *Pre-course Perceptions of Emergent Technology* online questionnaire (Appendix F) were emailed to them. This quantitative questionnaire took about 20 minutes to complete. Shortly before respondents began to work on their first assignment (about three weeks into the course), they were invited to participate in the first qualitative telephone interview (Appendix G: *Identifying Learning Paradigm Preferences*).

The process for both telephone interview phases used in the study remained consistent. Respondents were invited by email to participate in each interview about two weeks before the interview date. This email contained a reminder of the conditions for voluntary consent to participate, interview process details, and questions to be asked during the interview (Appendix H: *Telephone Interview Protocol*). The approximately half hour interview was arranged at a time that was convenient for respondents. Interviewees then received transcripts of the recordings to review and edit. Participants were reminded that receipt of the edited transcript indicated consent to have it used for analysis and that some sections of the transcript may be quoted verbatim in subsequent publications. All identifying information was purged from transcripts before they were added to the database.

Around the time that the course concluded, respondents were invited to respond to a similar online post-course questionnaire (Appendix I: *Post-course Perceptions of Emergent Technology Integration*), which took about 20 minutes to complete. About one to two weeks later, respondents were then invited to participate in the final telephone interview (Appendix J: *Revisiting Learning Paradigm Preferences*). No revisions were made to any instruments because the instruments had to be pre-approved by the dissertation and University research ethics committees.

Mid- and post-term interview data for each respondent was analyzed alone, and then combined in different manners for further analysis purposes, using NVivo Pro 11 and Excel 2010 software. The quantitative pre-term and post-term questionnaires were analysed in the same manner, using SPSS v. 23. In the final phase of this process, all data was combined to describe patterns of commonality, note unique or unexpected results, and determine what factors may have led to any changes over time.

Instruments.

One of the main sources that guided why and how each instrument was created or used was Cohen, Manion, and Morrison's (2011) seventh edition of the *Research Methods in Education* manual. This text offered expansive, detailed guidance supported by practical examples on why and how to gather data on respondent perceptions in relation to particular phenomena using a mixed methods approach. The manual provided advice on the development and use of questionnaires that employed rating scales to capture respondent perceptions to determine the extent to which respondents shared the same culture, the intensity and strength of that culture, and the congruency between the perceived existing and ideal cultures. These questionnaires were used in conjunction with qualitative interviews, which enabled the gathering of more in-depth data on intangible values, assumptions, and beliefs of the respondents in the study. The text also recommended collection of observational data to document various elements of the learning environments and respondents' reaction to these elements. Lastly, the manual suggested including other documentary sources to report upon such aspects as the formal matters of the program and course to determine what was included and not included in these aspects of school matters. Advice and examples given in this manual were supported by books and articles by Mertens (2003, 2007, 2012, & 2015) on developing and using instruments when conducting transformative mixed methods research as well. Other supplementary resources used to guide the development of these instruments included works by Creswell (2003, 2012), Creswell et al. (2003), and Onwuegbuzie and Leech (2007).

There were seven instruments used for this study (Figure 6). The pre- and post-course instruments were online, primarily quantitative questionnaires that asked students to: (1) rate personal emergent technology integration perceptions, experiences, drives, and preferences on ordinal and Likert scales, and (2) briefly describe any personal emergent technology integration learning goals that they may have had for the course.

Phase	Procedure	Product
1. Quantitative Data Collection	Cross-sectional pre-term online questionnaire (N=12)	Primarily numeric data Some qualitative comment options
2. Qualitative Data Collection	Cross-sectional mid-term telephone interview (N=12) Interview transcript verified by respondent	Verified qualitative interview transcript
3. Quantitative Data Collection	Cross-sectional pre-term online questionnaire (N=12)	Primarily numeric data Some qualitative comment options
4. Qualitative Data Collection	Cross-sectional mid-term telephone interview (N=12) Verification of interview transcript by respondent	Verified qualitative interview transcript
5a. Individual & Class Pre- & Post-term Qualitative Data Analysis	Coding and thematic analysis Within and across-transcript theme development Cross-thematic analysis NVivo 11 Pro; Excel 2010	Codes and themes Similar and different themes and categories Cross-factor themes
5b. Individual & Class Pre- & Post-term Quantitative Data Analysis	Frequencies analyses SPSS v. 23 & Excel 2010	Individual and class frequencies identified
6. Final Integration of All Data Results	Final interpretation and explanation of all quantitative and qualitative results, as well as researcher journal entries	Cumulative data analyses results Discussion, Implications, Future research

Figure 6. Transformative mixed methods design phases, procedures, and products for study.

The qualitative mid-course and post-course interviews asked students to identify the government, institutional, curricular, instructional, and environmental factors that most empowered them to integrate emergent technologies for learning on demand, and provide greater detail on identified pre-course questionnaire learning goals for integrating emergent technologies. The fifth instrument was a semi-structured interview used with each instructor. The purpose of this interview was to gain deeper insight into who controlled what factors and elements within each of these learning environments. Similar information about the course structure, syllabus, and other related information was also drawn as observational notes from the public course web pages. The final instrument was the researcher's reflective journal, which contains observational notes related to the course recruits, research practice and process notes, and related reflections.

Operationalizing concepts.

Previous chapters presented in-depth definitions of the concepts being examined in this study. Nevertheless, key concepts used in the questionnaires require further quantitative operationalization. It must be noted that these operational definitions are works in progress; they will evolve as subsequent research is undertaken. These concepts include: (1) autonomy, (2) mastery, (3) purpose, (4) innovation, and (5) reflection.

1. *Autonomy*: According to Pink (2009) there are four aspects of autonomy: "what people do, when they do it, how they do it, and whom they do it with" (p. 96). The questionnaires asked students to select who controls each of these aspects in regards to learning with emergent technologies in current and ideal learning environments. They were then asked to use an ordinal scale to determine whom they learn the most about emergent technologies from and what size of group they most prefer to learn about emergent technologies in.
2. *Purpose*: Purpose variables are taken from a breadth of literature, as espoused in Chapters 2 and 3. Respondents were asked to use ordinal and Likert scales to assess

their purpose for learning to integrate emergent technologies on demand in terms of economic, social, and altruistic aims.

3. *Mastery*: Respondents were asked to use an ordinal scale to determine their level of mastery with each of 16 identified emergent technologies. The categories were: little knowledge of, acquisition, practice, competency, and capacity. They were then asked to select the typical goal that they had for learning how to integrate most technology for learning on demand.
4. *Innovation*: Reflecting upon emergent technologies that they currently used for learning in school, work, and life in general, respondents were asked use a Likert scale to rate how much they use these technologies to: solve problems, create new products, determine new ways of interacting, transform the way they learn, and transform the ways that others learn.
5. *Reflection, critical reflection, and reflexivity*: Respondents were asked to use Likert scales to indicate their level of agreement with statements on reflection (i.e., thinking about the technical and procedural aspects of technology integration), critical reflection (i.e., thinking about how and why social groups/institution are using emergent technology), and reflexivity (i.e., thinking about how the emergent technology could empower and transform the respondent, other learners, and the world).

Ethical Considerations

To address issues of methodological rigour, researcher subjectivity, and ethics, research plans were first submitted to the University Research Ethics Board (REB), who carefully scrutinized the ethical aspects of this study (see Appendix K: AU REB Approval). No harm was expected to come to anyone involved in the study. The ongoing voluntary, anonymous nature and intended expectations for study participants was explained in the recruitment email and online informed consent form (Appendices D and E), along with further study details, such as data collection and storage issues.

Participants had to select the hyperlinked box indicating that they understood and accepted their role and study conditions before they could gain access to the first online instrument. A reminder of these expectations and the ability to withdraw at any time or from any part of the study without consequence was given before each subsequent instrument was used. While the researcher conducted the telephone interview process, every attempt was made to ensure that the process was handled ethically, following the REB-approved interview protocol (Appendix H). Following the interview script during the interview process, recording the interview, and having respondents verify the resultant transcript should have negated some other ethical, methodological, and researcher subjectivity concerns. Finally, no reward was offered to potential respondents beyond the satisfaction of knowing that they were assisting a fellow student in contributing to the academic body of knowledge. This was done in the critical pragmatic and learner-driven epistemic spirit of promoting intrinsic rather than extrinsic motivation.

Summary

This chapter delineates the methodological frameworks, processes, subjects, and instruments that were used to translate the epistemic, theoretical, and conceptual elements of the research project into research praxis. Every attempt was made to ensure compatibility and consistency between the theoretical and practical elements of this undertaking.

There were a number of ethical concerns that needed to be addressed, but it is believed that sufficient steps were employed to overcome these barriers. For instance, the mixed methods research design is one that the researcher is familiar with, as were the online quantitative and qualitative data collection and analysis procedures required for this study.

The models and instruments used for this study were novel. Even though much attention was devoted in this dissertation to carefully laying the foundations for each of these, future revisions are anticipated as further testing of the framework, model, taxonomy, and instruments ensues. The reflective journal not only recorded what some of these changes may be and why they may be deemed necessary, but may also illuminate underlying habituated beliefs and assumptions that can facilitate further researcher transformation as this researcher and others continue to review the project over time.

This chapter on the research methodology now draws to a close as the dissertation moves on to Chapter 5, which presents the results from data collected during the study.

Chapter V: RESULTS

This chapter first presents results gathered from quantitative pre- and post-course questionnaires on respondents' perceptions. Next, qualitative results gathered from two telephone interviews are given. (The first, or "mid-term," interview occurred approximately one month into the courses. The post-term interview was delivered two to eight weeks after the course was over.) The third section of this chapter presents merged quantitative and qualitative data results. Results from course web pages, instructor interviews, and the researcher's journal are also included where appropriate.

Given the sheer volume of data collected, only the most salient results are presented here. Other results are available upon request. Results are presented according to pre-term, early-term, mid-term, and post-term time stamps. All percentages included herein are rounded to the nearest tenth of a percent. Reporting begins with the results from the quantitative data gathered in this study.

Quantitative Results

Voluntary student participants came from two online master-level courses in the Master of Education in Distance Education (MEd DE) program at AU during the four-month Spring 2017 semester. Over 35% of the total population (N=34) invited to participate joined this exploratory study. Twelve respondents completed four instruments. Due to the small number of respondents in this exploratory study (n=12), quantitative results are not statistically significant. However, the triangulation of data from seven different instruments does help to validate the quantitative data collected, as well as shed some light on respondent profiles which, in turn, serve to extend and enrich the qualitative data findings (Cohen, Manion, & Morrison, 2011).

The following quantitative results are organized into five sections drawn from the omni-tech taxonomy (Figure 4). The first four sections (autonomy, purpose, mastery, and innovation) explore innate learning drives (Pink, 2009). The fifth section on reflective thought represents varying meta-cognitive and meta-affective means by which learners' perceptions are altered by new experiences.

Each section herein includes results for each question asked within that section of the questionnaires. Individual sub-section question results from the online pre- and post-term questionnaire are presented before summary results for the question are given. A final summary concludes the report on quantitative results. Reporting begins with respondent demographics.

Demographics.

Demographic respondent results from the pre-term questionnaire are reviewed before the omni-tech taxonomy subsection results begin. These demographics included respondent age range, gender, geographic location, and number of MEd DE program courses completed before the Spring 2017 term began.

Age.

Age range categories were broken down into five-year increments. One third of the respondents were between the ages of 50 and 54. Another quarter of the respondents were either between the ages of 35 and 39, or the ages of 45 to 49. Less than one tenth of the respondents were between the ages of 40 and 44, or 55 and 59.

Gender.

Over one third (35.3%) of students from the two courses joined the study. Study respondents mirrored gender ratios in the courses, with 75% respondents indicating that they were female, 16.7% male, and 8.3% choosing not to respond to the question. No one selected other gender options offered on the questionnaire.

Location.

Two out of five respondents reported living in a large urban center (population over 500,000). Of the remaining respondents, one-fifth lived in a medium urban (population of 100,000-499,999), one third in a small urban (population of 10,000-99,999), and one-tenth lived in a rural setting (within 2 hours of commuting distance from a large, medium, or small urban center). While it is not known if respondents resided within or outside of Canada, all interview phone numbers were Canadian.

Number of courses completed.

Five respondents had completed five or six courses before the Spring 2017 term. Four had completed seven or eight courses. One had not completed any courses, another one had completed three or four, and the final one had completed nine or more.

The following five sections belong to two categories. The first four sections, autonomy, purpose, mastery, and innovation, are measures of respondents' personal innate drives. The final section, reflection, critical reflection, reflexivity, is the means through which learners balance their perceptions and experiences with emergent technologies for learning on demand. All five sections contain measurements of respondents' perceptions as scored on Likert and nominal scales.

Autonomy.

Participants responded to three questions in this section of the pre- and post-term questionnaires. The first question asked about who currently made decisions and who should make future decisions about various course elements. The second asked respondents to indicate who they believed helped them to learn the most about a new technology. The final question asked what size of group learners felt that they best learned about emergent technologies in.

Course decisions.

The first question (who currently made most decisions and who should make these decisions about various course elements in the MEd DE program) required respondents to choose one response for each element presented. These elements included: (a) admissions, (b) curriculum, (c) course syllabus, (d) course objectives, (e) course assignments, (f) course grades, (g) program timelines (h) course activity timelines, (i) assignment timelines, and (j) study schedule. The options for who was, or should be making these decisions for each element were: (1) the student, (2) the student and instructor, (3) the instructor, (4) the faculty, (5) the institute, or (6) the government. Each element is first considered in isolation.

Two thirds (66.7%) of the respondents indicated that the institution *currently* made most decisions about program and course admissions. Another 20.8% thought that most of these decisions were made by faculty, while 8.3% thought that most were made by the student. Finally, 4.2% thought that most admissions decisions were made by the student and instructor.

When asked who *should* make decisions about admissions, 54.2 % of respondents selected the institution, 37.5% chose the faculty, and 8.3% felt it should be the student.

Half of the respondents (50%) indicated that it was the faculty who *currently* made decisions about the curriculum; 29.2% thought it was the institute. Another 8.3% thought it was the government who currently made such decisions. Lastly, 4.2% of respondents thought that it was the student, student and instructor, or the instructor who currently made most decisions about the curriculum.

Nearly three-quarters (70.8%) of respondents thought that the faculty *should* make most curricular decisions, 12.5% thought it should be the student and instructor, 8.3% thought it should be the instructor, and 4.2% thought it should be the institute or the government who made such decisions.

When asked who *currently* made most decisions about the course syllabus, 58.3% of respondents felt that the faculty currently made most of these decisions. Another 29.2% of respondents thought it was the instructor, and a final 12.5% indicated that it was the institute that made such decisions.

When asked who *should* make most decisions about the syllabus, 54.2% of respondents selected the faculty, another 29.2% chose the instructor, and a final 16.7% thought that the institute should make such decisions.

Half of the respondents (50%) indicated that it was the faculty who *currently* made most decisions about course objectives. Another 29.2% thought it was the instructor, 16.7% believed it was the institute, and a final 4.2% thought it was the student and instructor who made most decisions about course objectives.

Two fifths of questionnaire responses (41.7%) indicated that the student and instructor *should* make most decisions about course objectives. Another 37.5% of the responses suggested that the faculty should make such decisions, while a final 20.8% indicated that it should be the instructor.

There was a nearly even three-way split between respondents regarding who *currently* made most decisions about course assignments: 37.5% said that it was the instructor, 33.3% thought it was the instructor and the student, and a final 29.2% thought it was the faculty who made such decisions.

Almost two-thirds (62.5%) of respondents thought that the student and instructor *should* make most decisions about course assignments. Another 20.8% thought that the faculty should make such decisions. A final 8.3% thought that most decisions about assignments should be made by the student or the instructor.

Most respondents (83.3%) indicated that it was the instructor who *currently* made most decisions about course grades, while 12.5% thought it was the student and instructor who made most of these decisions. A final 4.2% of respondents thought that the institute made most course grade decisions.

On the other hand, 54.2% of respondents believed that the student and instructor *should* make most decisions about course grades. Another 25% thought it should be the instructor, 16.7% thought it should be the faculty, and a final 4.2% thought that the institute should make most decisions about course grades.

The next question asked respondents to indicate who *currently* made most decisions about the MEd DE program timelines. Over half of the respondents (54.2%) thought that it was the institute that made most of these decisions, while 20.8% thought that it was the instructor. Another 12.5% of respondents thought that it was the faculty, 8.3% thought it was the student, and a final 4.2% thought it was the student and instructor who currently made most decisions about the program timelines.

One third of respondents (33.3%) indicated that the faculty *should* make most decisions about the MEd DE program timeline; 29.2% thought it should be the student and instructor who made most of these decisions. Another 20.8% thought it should be the institute, while the final 8.3% thought it should be either the student or the instructor who made most program timeline decisions.

Two-thirds of questionnaire responses (66.7%) showed that the instructor *currently* made most decisions about activity timelines, whereas 16.7% indicated that either the student and instructor, or the faculty made most of these decisions.

Over half (54.2%) of respondents thought that the student and instructor *should* make most decisions about course activity timelines. A further 33.3% said that such decisions should be made by the instructor, and 12.5% felt that the faculty should make most decisions about activity timelines.

According to questionnaire responses, 70.8% of participants thought that the instructor *currently* made most decisions about course assignment timelines. One fifth (20.8%) of participants believed that the student and instructor made most of these decisions; a final 8.3% thought that it was the faculty.

When asked who *should* make most decisions about course assignment timelines, 70.8% of respondents felt that it should be the student and instructor, 20.8% thought it should be the instructor, and 8.3% thought it should be the student who made most of these decisions.

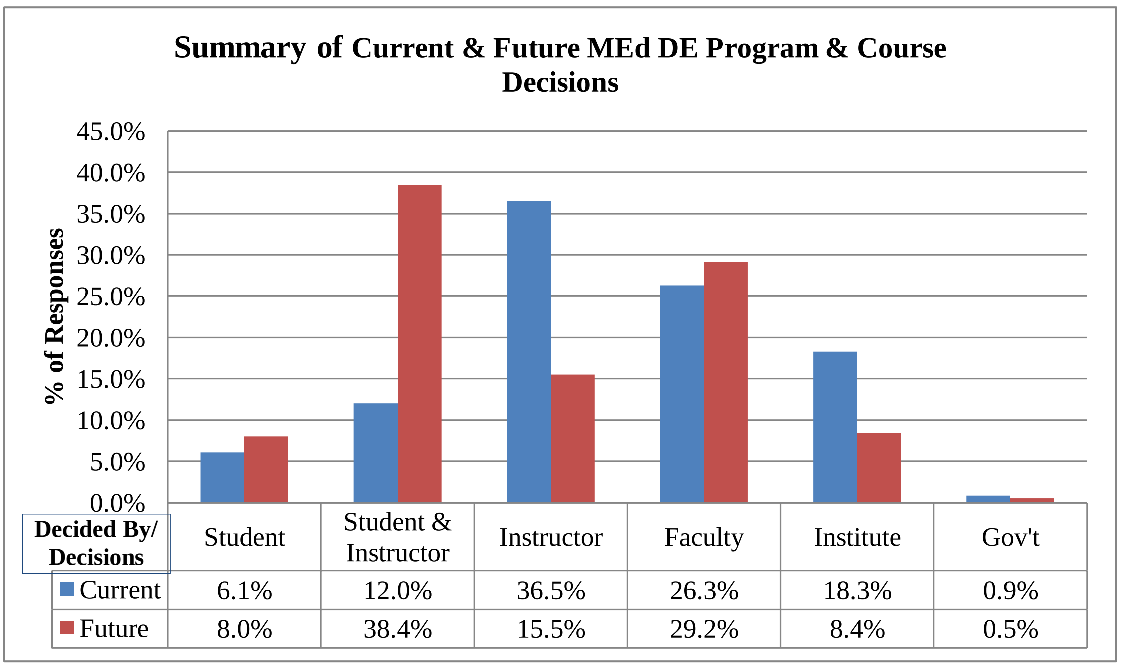
The final question on course decisions was about students' study schedules. Two-fifths (41.7%) of respondents thought that the student *currently* made most decisions about their course study schedule. Another 33.3% believed it was the student and instructor who made most of these decisions. A further fifth of the respondents (20.8%)

thought it was the instructor, and a final 4.2% thought it was the faculty who made most decisions about students' study schedules.

Half of the respondents (50.0%) felt that the student *should* make most decisions about their study schedules, while 41.7% thought it should be the student and instructor who made most of these decisions. A final 8.3% of respondents said that the instructor should make most decisions about students' study schedules.

Summary.

All data about the aforementioned course decisions was condensed to present an overall picture of study respondents' perceptions about whom *currently* made most decisions about the MEd DE program and their courses, and whom the respondents felt *should* make such decisions (Figure 7).



Decided By/ Decisions	Student	Student & Instructor	Instructor	Faculty	Institute	Gov't
Current	6.1%	12.0%	36.5%	26.3%	18.3%	0.9%
Future	8.0%	38.4%	15.5%	29.2%	8.4%	0.5%

Figure 7. A summary of pre- and post-term responses about who currently makes and who should make most decisions about the MEd DE program and related courses (by percent).

Collectively, most respondents indicated that they believed most *current* decisions about the program and course were made by the instructor (36.5%). This was followed by the faculty (26.3%) and then the institute (18.3%). Twelve percent of current decisions were made by the student and instructor, 6.1% by the student, and 0.9% by the government.

When asked who *should* make decisions about the program and course in the future, study respondents indicated that 38.4% of the decisions should be made by the student and instructor and 29.2% by the faculty. Another 15.5% of decisions should be made by the instructor, 8.4% by the institute, 8% by the student, and 0.5% by the government.

Emergent technology learning resources.

The next autonomy question asked study respondents to rate what learning source typically helped them to learn the most about new technologies on a scale of 0 to 5, where 0 = no response, 1 = I learn the least from this source, 3 = I learn moderately from this source, and 5 = I learn the best from this source. Sources included: (1) the formal online course instructor, (2) other students in an online course, (3) other class resources (including non-human resources and guest experts), (4) non-class learning communities (such as MOOCs or online technical communities), (5) work-based communities of practice (e.g., professional development communities), (6) online informal social networks (like Facebook or Twitter), (7) online information repositories (such as YouTube, blogs, or wikis), (8) the respondent's children, or younger family and friends, (9) the respondent's spouse, siblings, or other family and friends in the respondent's age range or older, and (10) the respondent's own trial and error experiences with new technology.

When asked what source they typically learned the most about how to use a new technology from, 33.3% of respondents indicated that they learned the very least, 20.8% said that they learned the best, 16.7% said that they learned moderately, 12.5% said that they learned the least, and 8.3% said that they learning more than moderately from their course instructor. A final 8.3% chose no response.

One third (33.3%) of respondents indicated that they learned about how to use a new technology moderately from other students, while 20.8% thought that they learned the least about this topic from other students. Another 16.7% thought that they either learned more than moderately or the very least from their classmates, while 8.3% believed that they learned the best from classmates. A final 4.2% declined to respond to this question.

One quarter (25.0%) of respondents said that they learned the least about how to use new technologies from class resources (that is, non-human resources and guest experts), while 20.8% thought that they learned more than moderately from class resources. Another 16.7% felt that they learned either the best or moderately, and 12.5% indicated that they learned the very least from class resources. A final 8.3% did not respond to the question.

The next category that study participants were asked to rate for the ability to help them learn how to use new technologies were learning communities outside of the current class setting, such as MOOCs, or online technical groups. One quarter (25%) of respondents indicated that they learned the best, and 20.8% said that they either learned moderately or the least about how to use new technologies from learning communities. A further 20.8% said that they learned moderately from these communities, while a final 8.3% either chose not to offer a rating, or reported that they learned the very least from learning communities.

The next category that respondents were asked to rate concerning the ability to help them learn how to use new technologies was work-based communities of practice (such as professional development communities). Over one third (37.5%) of respondents learned how to use new technologies moderately well from work-based communities of practice. Another 29.2% thought that they learned best, 16.7% indicated that they learned more than moderately, and 12.5% learned the least from such communities. A final 4.2% reported learning the very least from work communities.

When asked to rate how well online informal social networks, like Facebook or Twitter, helped them to learn how to use new technologies, 41.7% of study participants indicated that they learned moderately from such networks. Another 20.8% either chose not to answer the question, or rated these networks as the very least helpful resources for learning how to use new technologies. Finally, 8.3% learned the least or more than moderately about these technologies from online informal networks.

The next resource that respondents were asked to rate was online information repositories, such as YouTube, blogs, or wikis. Almost half (45.8%) of the respondents reported that they learned how to use new technologies the best from these online resources. Another 29.2% rated these repositories as more than moderately helpful. A further 12.5% of participants learned moderately and 8.3% learned the very least from online repositories. Lastly, 4.2% declined to answer this question.

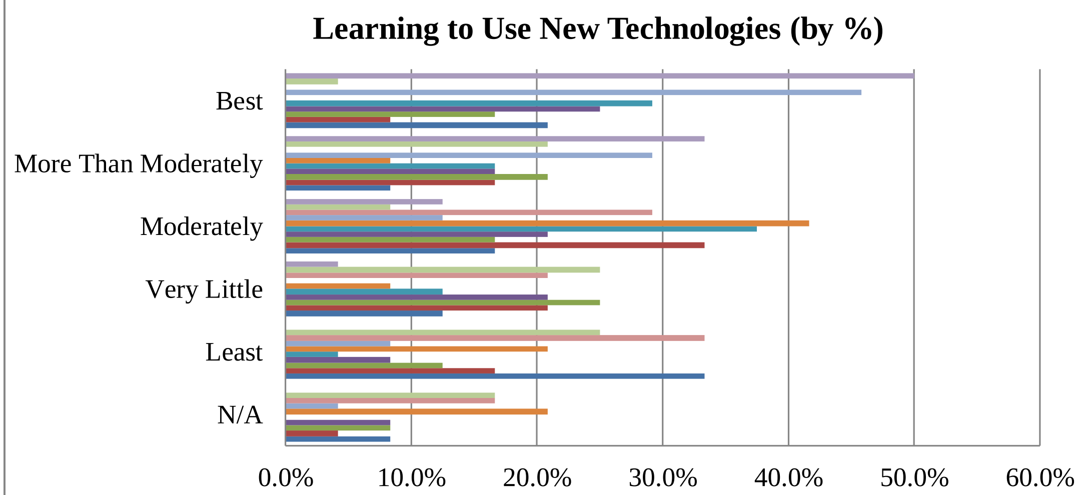
When asked to rate how helpful their children or younger family and friends were in teaching respondents how to use new technologies, responses indicated that 33.3% of participants felt that such youthful human resources were the very least helpful, while 29.2% indicated that youths were moderately helpful, and 20.8% said that they were the least helpful. The final 16.7% of participants did not respond to the question.

The next category that respondents were asked to providing ratings for included the respondents' spouses, siblings, or other family friends in the respondents' age range, or who were older than the respondents were. One quarter of respondents indicated that they either learned the least or the very least about how to use new technologies from older family and friends. Another 20.8% felt that they learned more than moderately well from older family and friends, while 16.7% declined to respond to the question. A further 8.3% felt that they learned moderately, and a final 4.3% believed that they learned how to use new technologies the best from these older human resources.

The final category that participants in this study were asked to rate was their own trial and error experiences for learning how to use a new technology. Half (50.0%) of the respondents rated personal trial and error as the best means for learning how to use a new technology. A further 33.3% indicated that they learned more than moderately, and 12.5% reported that they learned moderately from trial and error. The final 4.2% stated that they learned the least through personal trial and error.

Summary.

Overall, the most highly rated resource for helping the study participants learn about a new technology is personal trial and error (50%; Figure 8). The second highest rating for the best resources is online repositories (45.8%). Trial and error was also rated highest in the more than moderately helpful resource category (33.3%), followed by online repositories (29.2%). In the moderately helpful category, online informal networks were rated the highest (41.7%), and work communities were reported to be second-highest (37.5%). The two highest ratings in the little helpful category were older family and friends and class resources (both were 25%). These were followed next by younger family and friends, and fellow classmates (20.8% for each). Younger family and friends, as well as the instructor were rated the highest in the least helpful category (33.3% each), followed by older family at friends at 25%. The resource that was least likely to be rated by respondents was online informal networks (20.8%); the second highest rating in this category was shared by older family and friends, and younger family and friends (both being rated at 16.7%). The only resource not listed as one of the two highest ratings in any category was learning communities. Learning community ratings averaged 20.8% across the very little to best categories, and earned 8.3% in the no response and least helpful categories.



Rating Scale/ Learning Resource	N/A	Least	Very Little	Moderately	More Than Moderately	Best
Trial/Error	0.0%	0.0%	4.2%	12.5%	33.3%	50.0%
Older Family/Friends	16.7%	25.0%	25.0%	8.3%	20.8%	4.2%
Children/Young	16.7%	33.3%	20.8%	29.2%	0.0%	0.0%
Online Repositories	4.2%	8.3%	0.0%	12.5%	29.2%	45.8%
Online Informal Net	20.8%	20.8%	8.3%	41.7%	8.3%	0.0%
Work Communities	0.0%	4.2%	12.5%	37.5%	16.7%	29.2%
Learn Communities	8.3%	8.3%	20.8%	20.8%	16.7%	25.0%
Class Resources	8.3%	12.5%	25.0%	16.7%	20.8%	16.7%
Students	4.2%	16.7%	20.8%	33.3%	16.7%	8.3%
Instructor	8.3%	33.3%	12.5%	16.7%	8.3%	20.8%

Figure 8. A summary of pre- and post-term responses rating learning resources that best help these students learn how to use a new technology (using a Likert scale where 0=no answer, 1= least useful resource, 3=moderately useful resource, and 5=best resource. Results are reported by percent).

Learning situations.

The final question asked in the autonomy section of the pre- and post-term questionnaires was about what kind of learning situation study respondents felt that they learned best in. The situation categories were: (1) alone, (2) one-on-one with another person (e.g., myself and a tutor), (3) In small groups (in groups of 3 to 10 people), (4) typical class group sizes (in groups of 20 to 30 people), and (5) in MOOCs (classes with 100 or more people). Respondents were asked to rate each situation using a Likert scale, where 0=no response, 1=I learn least in this situation, 3=I learn moderately in this situation, and 5=I learn best in this situation.

Three out of four respondents (75.0%) reported that they learned best when alone, while 20.8% said that they learned more than moderately, and 4.2% learned moderately well alone.

There was an even division (41.7% each) between respondents who reported learning best or more than moderately well when they were working with one other person, such as a tutor. Another 12.5% thought that they learned moderately well one-on-one, and a final 4.2% indicated that they learned least in this situation.

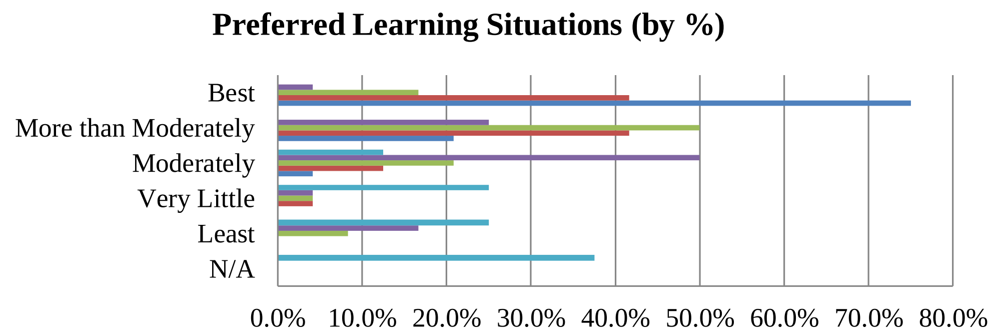
When asked to rate how well they learned in group situations with three to ten people, 50.0% of respondents rated their ability to learn in this kind of situation as more than moderately well. Another 20.8% felt that learning in groups of three to ten people was a moderately preferred learning situation for them. Another 16.7% felt that they learned best, 8.3% thought that they learned the very least, and 4.2% indicated that they learned the least in this size of group.

When asked how well they learned in a typical class size of 20 to 30 people, 50.0% of respondents indicated that they learned moderately well and 25.0% reported learning more than moderately well in this situation. A further 16.7% felt that they learned the very least in this size of group. The final 4.2% either felt that they learned the least or the best in the average class-sized group.

Lastly, respondents were asked to rate how well they typically learned in MOOCs, or classes with 100 or more people. Over one third (37.5%) of the participants did not respond to this question. Among those who did respond, one quarter (25.0%) said that they learned the least or the very least, and the remaining 12.5% felt that they learned moderately well in this situation.

Summary.

Three quarters of study participants reported that they learn best when they are alone and another 41.7% indicated that they learn best in one-on-one situations (that is, learning with one other person, such as a tutor; Figure 9). Fifty percent of all respondents said that they learn more than moderately well in groups of three to ten people.



Rating Scale/ Learning Situation	N/A	Least	Very Little	Moderately	More than Moderately	Best
MOOCs (Over 100 people)	37.5%	25.0%	25.0%	12.5%	0.0%	0.0%
20-30 People	0.0%	16.7%	4.2%	50.0%	25.0%	4.2%
3-10 People	0.0%	8.4%	4.2%	20.9%	50.0%	16.7%
1-on-1	0.0%	0.0%	4.2%	12.5%	41.7%	41.7%
Alone	0.0%	0.0%	0.0%	4.2%	20.9%	75.0%

Figure 9. A summary of pre- and post-term responses rating learning situations that these students learn in (using a Likert scale where 0=no response, 1= least useful situation, 3=moderately useful situation, and 5=best situation. Results are reported by percent).

The second highest rating for situations in which respondents learned more than moderately well was one-on-one (41.7%). Fifty percent of respondents also reported learning moderately well in classes of regular group sizes (that is, 20 to 30 people). The second highest ranking for situations where respondents learned moderately well was in groups of 3 to 10 people (20.9%). The highest rating for situations in which respondents learned very little in was MOOCs (25%). This ranking was followed by a three-way tie between one-on-one, three to ten people, and 20 to 30 people (4.2%). Twenty-five percent of all respondents reported learning the least in MOOCs, with the second-highest ranking for situations in which respondents learned the least was in groups of 20 to 30 people (16.7%). The highest and sole rating for the no-response category was MOOCs (37.5%).

Purpose.

In the purpose section of the pre- and post-term questionnaires, respondents were first asked about setting and achieving personal technology integration goals for the course under study. On the post-questionnaire, respondents where then asked to determine what level of teacher or expert support (that is, scaffolding) they thought that they required compared to their classmates, and how significant their learning curve was over the term. Both questionnaires then asked respondents to rate individual and overall economic and academic status, social connection, and altruistic purposes for perpetually integrating emergent technologies. The results from this section are shared according to the order that these sub-sections were presented in the questionnaires, beginning with the setting and achieving of personal technology integration goals.

Personal technology integration goals.

All respondents were informed on the pre-course questionnaire that the course they were enrolled in during this study had no formal requirement for students to set a goal for integrating any emergent technology during the term. It was stressed that the purpose of the following question was to determine if respondents had made an independent or voluntary decision to set a technology integration goal in their daily school, work, or personal life during the school term. Examples of some possible personal technology integration goals were then given. The post-questionnaire reminded respondents that there was no formal requirement to set a personal technology integration goal and that the purpose of the question was to determine if they had set their own goal (see Appendices F and I). Pre-questionnaire responses about setting such a personal goal are presented first.

On the pre-questionnaire, respondents were asked to indicate whether they had set a personal technology integration goal. Response options included: yes, no, not sure, and no response. In response to this question, 75.0% of respondents said yes, 16.7% said no, and 8.3% were not sure.

When asked on the post-term questionnaire if they had worked on their personal emergent technology goal during term, 58.3% of respondents said no and 41.7% said yes.

The next two questions on the post-term questionnaire were premised with the statement, “This course exposed you to a wide variety of emergent technology integration concepts, processes, and practices.” Respondents were then provided with a Likert rating scale of 0-5 for responding to the questions, where 0=no response, 3=neutral, and 5=strongly agree. The first question was on scaffolding.

Scaffolding.

On the post-questionnaire, respondents were asked if they required more instructor or expert support than most students to learn about the various emergent technology integration topics in the course. In reply to this question, 50.0% of study participants strongly disagreed, while 16.7% either disagreed or selected the option, neutral. The final 8.3% either strongly agreed with this statement or declined to respond to the question.

Learning curve.

Respondents were also asked at the end of the term if they had experienced a significant learning curve upon being exposed to emergent technology integration topics in the course. One quarter (25.0%) of respondents either strongly disagreed or disagreed, while 16.7% expressed neutrality or strongly agreed, while the final 8.3% either agreed with this statement, or did not answer the question.

Aims.

This section of the pre- and post-questionnaires asked respondents to determine how important it was for them to perpetually integrate emergent technologies as defined by the literature in Chapter 2. These areas were: (1) obtaining higher economic or academic status, (2) forming more social connections, and (3) obtaining greater altruistic learning aims. Respondents used a Likert scale of 0-5 to rate how important emergent technology integration was to achieving each aim, where 0=no response, 3=neutral, and 5=strongly agree. The first aim reviewed is improved economic or academic status.

Three sub-questions were employed to assess how important perpetual integration of emergent technologies was to participants when seeking improved economic or academic status. The first question was about improving career options, the second about obtaining higher levels of academic certification, and the final was about remaining competitive in the global job market.

Individual results for each question are addressed before a collective summary is offered herein, starting with responses to the first question.

When asked to rate how important it was to perpetually integrate emergent technologies so that respondents could improve their *career options*, 54.2% of respondents strongly agreed, 29.2% agreed, and 16.7% were neutral about how important perpetual technology integration was to career goals. In terms of perpetual emergent technology integration and *academic pursuits*, 37.5% of respondents were neutral, 29.2% strongly agreed, 20.9% agreed, and 4.2% provided no response, strongly disagreed, or disagreed. Finally, when asked about the same question in regards to *competing on the global job market*, 66.7% of respondents strongly agreed, 25% agreed, and 8.4% were neutral about how important perpetual integration of emergent technology was to achieving this aim.

In the next sub-section respondents were asked to rate the importance of perpetual emergent technology integration to three aims: (1) interacting more fully with experts, colleagues, and peers, (2) interacting more fully with informal social networks (for example, family and friends), and (3) finding and sharing information and other resources.

When asked to rate how important perpetual emergent technology integration was to their *ability to interact more fully with experts, colleagues, and peers* on the pre-term questionnaire, 50% of respondents strongly agreed and 37.5% agreed that perpetual integration of emergent technologies was important for interacting more fully with experts, colleagues, and peers, while 12.5% expressed neutrality about this. Secondly, 33.4% indicated neutrality, 20.9% agreed, 16.7% strongly agreed, 12.5% strongly disagreed or disagreed about the importance of technology integration for *interacting through informal networks*. A further 4.2% declined to respond to this question. Lastly, 41.7% of respondents agreed or strongly agreed about the importance of integrating emergent technologies to obtain and share information, while 16.7% indicated neutrality.

The importance of the perpetual integration of emergent technologies for achieving altruistic learning aims among respondents was rated on the same Likert scale as the preceding economic/academic status and social connection aims were. Three altruistic learning sub-questions were considered: (1) creating new learning resources to empower others, (2) engaging in the challenge of learning for the sake of learning, and (3) using these technologies in innovative ways to solve real world problems. The results for each are presented in the order listed above.

Altruistic learning results for both courses indicated that 70.9% of all respondents strongly agreed and 29.2% agreed that it was important to perpetually integrate emergent technologies to create new learning resources to empower others. Thirty-seven and a half percent of respondents strongly agreed or agreed that it was important to perpetually integrate emerging technologies for engaging in the challenge of learning for the sake of learning. A further 8.4% strongly disagreed, disagreed, or were neutral about the importance of integrating technology for the sake of learning.

Finally, when it came to using these technologies in innovative ways to solve real world problems, 54.2% strongly agreed, 25% agreed, and 20.9% were neutral about the importance of perpetually integrating emergent technologies for this purpose.

To summarize the overall importance of integrating emergent technologies on an ongoing basis for economic/academic, social, or altruistic purposes, respondents were asked to use a Likert rating scale, where 0=no response, 3=of average importance, and 5=most important.

Overall, 45.9% of respondents strongly agreed, 20.9% were neutral, 16.7% agreed, and 8.4% provided no response or strongly disagreed that the ongoing integration of emergent technologies was important to them for achieving economic aims (Figure 10). When asked the same question about social aims, 33.4% agreed, 20.9% strongly agreed, 16.7% disagreed, and 12.5% strongly disagreed that perpetual technology integration was important, while 4.2% did not respond. Finally, 41.7% were neutral, 37.5% strongly agreed, and 20.9% agreed that ongoing emergent technology integration was important for the altruistic aim of challenging themselves as learners.

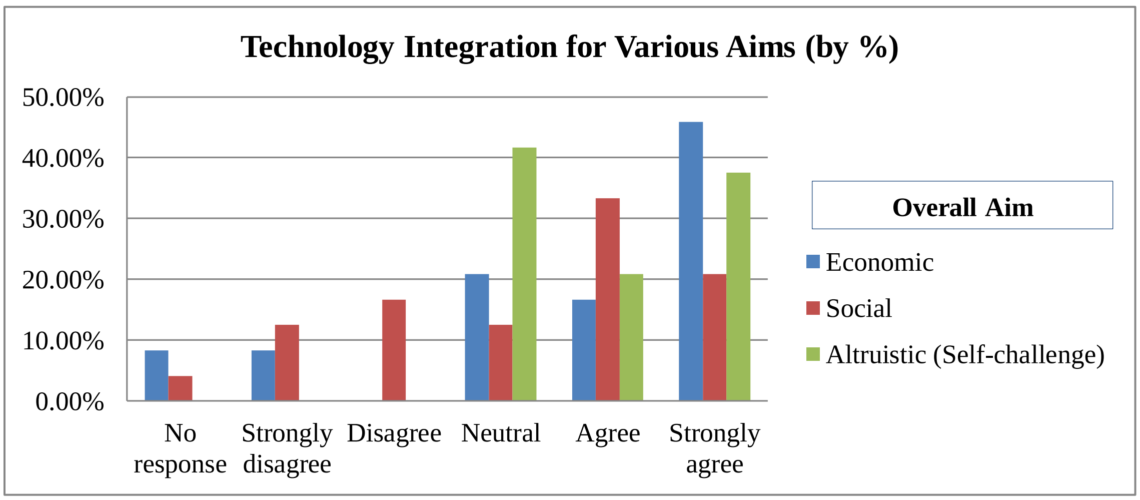


Figure 10. A summary of pre- and post-term responses rating how important perpetual technology integration is to respondents for achieving economic, social, and altruistic learning aims (using a Likert scale where 0=no response, 1= least important, 3=of average importance, and 5=most important. Results are reported by percent).

Mastery.

Two questions were included in the section on mastery. The first question asked respondents to rate their perceived level of competency with a variety of emergent learning technologies. The second question asked them to determine what their primary goal was for learning how to integrate most emergent technologies. Responses to the initial question were addressed first.

Competency with emergent technologies.

Study participants were asked to rate the degree to which they currently integrated each of the 16 listed emergent technologies into their daily lives using a rating scale where 0=no response, 1=little knowledge (I know very little about this technology), 2=acquisition (I am beginning to gain the basic skills and knowledge required to use this technology), 3=practice (I am practicing how to use this technology), 4=competency (I am able to use this technology as required for school or work), and 5=capacity (I adapt this technology for use in unique or novel situations). These technologies included: 3D printing, augmented reality (AR), cloud computing, conversational interfaces, educational gaming technology, flipped classrooms, interactive whiteboards, learner analytics, mobile learning, MOOCs, online learning management systems (LMSs), online social networking, open content, QR codes, tablet computing, and wearable smart technology.

Individual results are presented for each technology before a summary of all data is reported upon in this section. Reporting begins with respondents' level of mastery with 3-D printing.

When asked to rate their perceived level of mastery with 3D printing technologies, 75.0% of respondents reported having little knowledge, while 8.3% rated themselves as being at the practice, competency levels, or declined to respond to the question.

Over half of the respondents (58.3%) indicated that they had little knowledge and 16.7% were at the practice level of mastery with augmented reality (AR) technologies. A further 8.3% felt that they were at the acquisition or competency level with AR, or declined to respond to the question.

The third technology that respondents were asked to rate their level of mastery with was cloud computing. One third (33.3%) of respondents indicated that they were at a competency or capacity level, 12.5% had little knowledge or were acquiring knowledge, and a final 8.3% were at the practice level with cloud computing technologies.

Next, respondents were asked to rate their perceived levels of competency with conversational interfaces, such as Siri, Cortana, Google Now, and Dragon Naturally-Speaking. Study responses indicated that 41.7% of participants had little knowledge, 20.8% were acquiring knowledge, and 12.5% were at the competency level with conversational interfaces. A further 8.3% were at the practice or capacity levels, or declined to rate their level of mastery with these technologies.

When asked to rate their level of mastery with educational game technologies, 33.3% of respondents perceived that they had little knowledge, while 29.2% felt that they were competent with these technologies. A further 12.5% were at the practice level, and a final 8.3% were either at the capacity level with educational game technologies, or declined to respond to the statement.

Mastery level ratings for the conceptual technology of flipped classrooms among respondents suggested that 41.7% were acquiring such skills, 29.2% felt competent, 12.5% had little experience, and 8.3% were at a practice level with this technology. A final 4.2% were either at a capacity level with flipped classrooms or declined to respond to the question.

When asked to rate their level of mastery with interactive whiteboards, 29.2% of respondents reported having little knowledge about these technologies. A further 25% were practicing, 20.8% were acquiring, and 8.3% had achieved competency or capacity levels of mastery with interactive whiteboards, or did not answer the question.

Learner analytics was the next form of technology that respondents were asked to rate their level of mastery with. Half of study respondents (50.0%) rated themselves at the little knowledge level, while 20.8% reported being at the acquisition level, and 12.5% said that they were at the competency level with such technology. The remaining 8.3% of respondents were either at the practice or capacity levels with learning analytics.

Almost half of the respondents (45.8%) felt that they were competent in mobile learning, while another 20.8% indicated that they were either acquiring or practicing mobile learning skills. Another 8.3% of respondents had little knowledge and a final 4.3% were at a capacity level with mobile learning.

Next, participants were asked to rate their level of mastery with MOOCs. Over a third of respondents (37.5%) felt that they were at the acquisition level with MOOCs; 29.2% indicated that they little knowledge about this form of technology. A further 16.7% said that they were at the competency level, while 4.2% were either at the capacity level with MOOCs or had little knowledge about this technology. A final 8.3% of participants declined to respond to the question.

Mastery levels with online learning management systems (LMSs) were rated next by study participants. Over half (54.2%) of respondents felt that they were at the capacity level with LMS technologies. A further 16.7% were either at the competency or practice levels, while 8.3% felt that they had little knowledge about LMSs. The final 4.2% were at the practice level with this form of technology.

Mastery level ratings for online social networking technologies were also sought from study respondents. Findings indicated that 41.7% of respondents were at a competency level and 20.8% were at the capacity level with online social networking. A further 16.7% of participants were at the practice level, while 12.5% were at the acquisition level. Lastly, 4.2% of respondents reported having little knowledge of, or declined to rate their level of mastery with online social networking technologies.

Open content, including open educational resources (OERs), was the next area that respondents were asked to rate their level of mastery with. Almost one third of participants (29.2%) reported being at the practice level, 20.8% were at the competency level, 16.7% were at the capacity level, and 12.5% were at the acquisition or little knowledge level with open content technologies. A final 8.3% of participants did not answer the question.

When participants were asked to rate their level of mastery with QR codes, 25.0% indicated that they had little knowledge or were beginning to acquire skills with this technology. Another 16.7% of respondents felt that they were at a capacity level with QR codes, while a further 12.5% were at the competency level or did not rate their level of mastery with this technology. A final 8.3% of participants reported being at the practice level with QR code technologies.

Respondents were then asked to rate their level of mastery with tablet computing. Almost half (45.8%) of participants indicated that they were at the competency level, while 20.8% reported being at the practice level with tablet computing. A further 12.5% said that they were at the capacity level or had little knowledge of tablet computing. A final 8.3% did not rate their level of skill in this area.

The final emergent technology that respondents were asked to rate their level of mastery with was wearable smart technology. According to their questionnaire responses, 29.2% of respondents were at a little knowledge level, 25.0% at an acquisition level, 16.7% at a practice level, and 12.5% at a competency level with wearable smart technologies. A remaining 8.3% of respondents were either at a capacity level with this form of technology or did not respond to the statement.

Summary.

In summary, the highest level of mastery among participants at the capacity level was with online LMS technologies (54.2%; Figure 11). The second highest capacity level rating was cloud computing (33.3% of respondents). The highest competency level rating was shared by mobile learning and tablet computing (45.8% of respondents). Online social networking was the second highest rating in the competency category (41.7%). In the practice category, mastery with open resources was rated highest (29.2% of respondents) and interactive whiteboards was second-highest (25.0%). The flipped classroom obtained the highest mastery rating in the acquisition category (41.7% of respondents), while MOOCs came in second (37.5%). In the little knowledge category, 3D printing was the highest (75% of respondents); AR was next (58.4% of respondents), followed closely by learning analytics (50%). While 4.2% to 8.4% of all respondents chose not to rate their level of mastery for most of the emergent technologies listed, 12.5% did not rate themselves for QR codes.

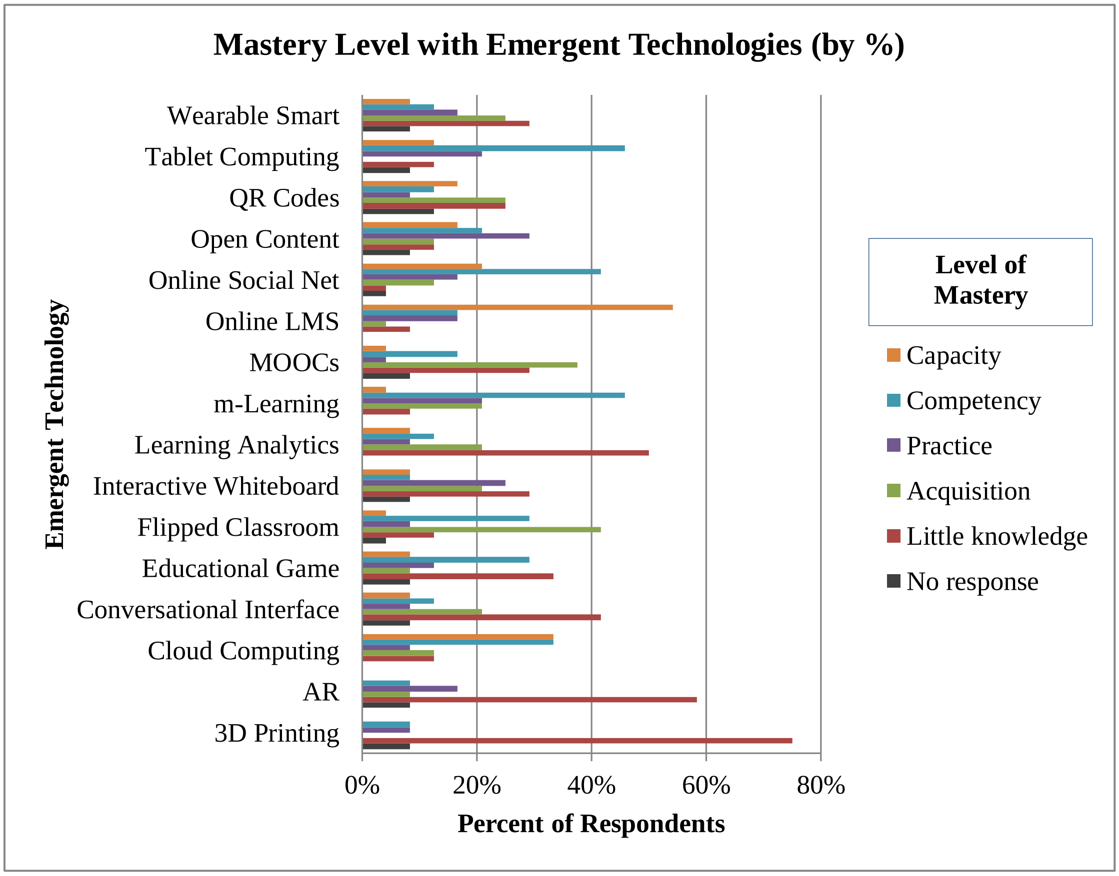


Figure 11. A summary of pre- and post-term responses rating level of mastery with various emergent technologies (using a Likert scale where 0=no response, 1= little knowledge, 3=practice, and 5=capacity. Results are reported by percent).

Primary technology integration goal.

The final mastery question asked respondents to select their primary goal for learning how to integrate most emergent technologies from a list of five options: (1) knowing how to use the basic functions of a new technology for school, work, or personal purposes, (2) practicing becoming comfortable with using the technology, (3) being as competent with the new technology as their colleagues or peers, (4) transferring what they know about the new technology to new situations, or (5) discovering functional and structural patterns that are common to most emerging technologies in order to apply this knowledge to future emerging technologies.

Results indicated that 33.3% of respondents felt that their primary goal for learning how to integrate emergent technologies was to transfer knowledge to new situations. A further 29.2% perceived that their primary goal was to discover functional and structural patterns common to most emergent technologies. Nearly one fifth of participants (20.8%) felt that their primary goal was to know the basic functions of a new technology; 12.5% most wanted to practice becoming comfortable with the technology, and the final 4.2% wanted to become as competent with a new technology as their colleagues or peers were.

Next, the questionnaires focused upon the innate drive to innovate.

Innovation.

In this section of the questionnaires, attention focused upon respondents' level of innate drive to use emergent technologies for various reasons within school and work, as well as home and other informal settings. A Likert scale (where 0= no response, 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree) was used by participants to rate their level of agreement with five statements under each setting sub-section. Reasons that they were asked to rate included: (1) solving problems, (2) creating new products/resources, (3) creating new ways to interact with others, (4) transforming the way that respondents' learn, and (5) transforming the way that others learn. The first results discussed herein relate to school settings.

School settings.

In this sub-section of the questionnaires, participants were asked to rate their level of agreement with five statements about their preferred use of emergent technologies in school settings, beginning with the desire to solve problems.

When asked to rate their level of agreement to the statement, "As a learner in school settings, I like to use emergent technologies to solve problems," 45.8% of respondents reported that they agreed and 33.3% strongly agreed with the statement. Another 16.7% of respondents expressed neutrality and 4.2% strongly disagreed with the statement.

The second statement that respondents were asked to rate their level of agreement with regarded the use of emergent technologies to create new products or resources in school settings. Almost half (45.8%) of the respondents strongly agreed and 33.3% agreed that they liked to use emergent technologies for creating new products or resources in school. The remaining 20.8% of respondents were neutral about this statement.

When asked to rate their level of agreement with the statement that they liked to use emergent technologies to create new ways of interacting with others in school settings, 33.3% of participants strongly agreed or agreed, 29.2% expressed neutrality, and 4.2% disagreed with this statement.

Next, respondents were asked to rate their level of agreement to the statement that they liked to use emergent technologies to transform the way that they learned at school. Half (50.0%) of the respondents agreed and 33.3% strongly agreed with this statement. A further 8.3% of respondents were neutral about using emergent technologies to transform the way that they learned at school, and a final 4.2% disagreed or strongly disagreed with this statement.

The final statement that respondents were asked to rate their level of agreement with in school settings was about liking to use emergent technologies for transforming the way that others learn. Over one third (37.5%) of the respondents strongly agreed or agreed, while 20.8% expressed neutrality and 4.2% disagreed with this statement.

Summary.

Cumulative results from pre- and post-term data for both courses discussed herein considered the two highest ranked reasons given for liking to use emergent technologies in school settings within each Likert scale category. In the strongly agree category, the creation of new products and resources ranked highest (45.8%), and transforming the way others learn was second-highest (37.5%). The top rating in the agree category was for using these technologies to transform the respondents' own learning; solving problems came in second (45.8%). Creating new ways to interact with others ranked first (29.2%), while creating new products/resources and transforming the way that others learn ranked second (20.9% each) in the neutral category. Disagree and strongly disagree category rankings were negligible (≥4.2%). There were no statistics to report in the no response category.

Work settings.

In this sub-section of the questionnaires, respondents were asked to rate their level of agreement with the statements that they liked to use emergent technologies at work to: (1) solve problems, (2) create new products/resources, (3) create new ways of interacting with others, (4) transform the way that the respondent learned, and (5) transform the way that others learned. The results for each statement are presented separately before cumulative data for this sub-section is discussed.

Fifty percent of respondents strongly agreed or agreed that they liked to use emergent technologies to solve problems in workplace settings.

Next, participants were asked to determine how much they agreed with the statement that they liked to use emergent technologies at work to create new products or resources. Over half (54.2%) of the respondents strongly agreed and 41.7% agreed with this statement. A final 4.2% of respondents did not provide a rating for this statement.

The third statement that respondents were asked to rate their level of agreement to the statement that they liked to use emergent technologies at work to create new ways to interact with others. In response to this statement, 41.7% of participants reported that they agreed, while 37.5% strongly agreed. A further 20.8% of participants indicated neutrality towards this statement.

The fourth statement that respondents were asked to rate their level of agreement to was about liking to use emergent technologies to transform the way that they learned in workplace settings. Two-fifths (41.7%) of respondents agreed and 33.3% strongly agreed with this statement, while 12.5% indicated neutrality. Of the remaining respondents, 8.3% disagreed and 4.2% strongly disagreed that they liked to use emergent technologies to transform the way that they learned at work.

The final statement that respondents were asked to rate their level of agreement for was about liking to use emergent technologies to transform the way that others learn in work settings. Results indicated that 50.0% of the respondents strongly agreed, 37.5 % agreed, and 8.3% disagreed with the statement. The remaining 4.2% of respondents were neutral about liking to use emergent technologies to transform the way that others learned in workplace settings.

Summary.

The following summary of pre- and post-term work setting results for both courses highlights the highest two rankings for each Likert scale category mentioned in this sub-section. When asked to rate their level of agreement with the statement that they liked to use emergent technologies at work for the five listed reasons, results indicated that the most highly ranked reason in the strongly agree category was to create new products or resources (54.2%), while solving problems and transforming others' learning ranked second (50% each). Solving problems ranked highest in the agree category; new products/resources, creating new ways to interact with others, and transforming respondent's own learning were second highest (41.7% each). In the neutral category, creating new ways to interact with others ranked first (20.8%) and transforming respondents' own learning was second (12.5%). Only two statistics were found in the disagree category; transforming respondents' own learning and transforming others' learning were both 8.3%. Negligible results were reported in the strongly disagree and no response categories ($\geq$4.2%).

The final sub-section in the innovation section of the pre- and post-term questionnaires asked respondents to rate their level of agreement with the same five statements within the home setting.

Home settings.

In this subsection, respondents were asked to rate their level of agreement to the statements that they liked to use emergent technologies at home and in other informal social settings to: (1) solve problems, (2) create new products/resources, (3) create new ways of interacting with others, (4) transform the way that the respondent learned, and (5) transform the way that others learned. Separate results for each statement are presented before cumulative data for this sub-section is reviewed. The first statement considered relates to solving problems.

Participants were first asked to rate their level of agreement with the statement that they liked to use emergent technologies to solve problems in home and other informal social settings. Half of the respondents (50.0%) agreed and 33.3% strongly agreed with the statement, while 8.3% indicated neutrality. A further 4.2% of respondents disagreed or strongly disagreed with this statement.

The second statement asked respondents to select their level of agreement with the statement that they liked to use emergent technologies to create new products or resources in home and other informal social settings. One third (33.3%) of the respondents agreed, 29.2% expressed neutrality, and 12.5% strongly disagreed with this statement. A remaining 8.3% of respondents strongly agreed, disagreed, or declined to respond to the statement about liking to use emergent technologies to create new products or resources in home and other informal social settings.

The third statement asked respondents to select their level of agreement with the statement that they liked to use emergent technologies to create new ways of interacting with others in home and other informal social settings. Two-fifths (41.7%) of the participants were neutral about this statement. Another 37.5% of participants agreed, 12.5% strongly agreed, and 8.3% strongly disagreed that they liked to use emergent technologies to create new ways of interacting with others in home and other informal social settings.

The next statement that respondents were asked to indicate their level of agreement with was about liking to use emergent technologies to transform their own learning in home and other informal social settings. Results indicated that 37.5% of the participants agreed, 29.2% strongly agreed, and 12.5% disagreed or strongly disagreed with this statement. A final 8.3% of the participants reported being neutral about liking to use these technologies to transform their own learning in home and other informal social settings.

The final statement that participants were asked to indicate their level of agreement with was about liking to use emergent technologies to transform the way that others learn in home and other informal social settings. Results showed that 41.7% of these respondents expressed neutrality, 20.8% strongly disagreed, and 16.7% strongly agreed or agreed with this statement. The remaining 4.2% of respondents disagreed that they liked to use emergent technologies to transform the way that others learned in home and informal social settings.

Summary.

The two highest ranking reasons for liking to use emergent technologies drawn from the culmination of pre- and post-term data for both courses are highlighted herein for each Likert scale category used in this section of the study.

Solving problems (33.3%) and transforming respondent's own learning (29.2%) ranked highest in the strongly agree category. Solving problems came first (50.0%), while creating new interactions with others and transforming others' learning tied for second place (37.5%) in the agree category. In the neutral category, creating new interactions with others and transforming others' learning ranked first (41.7%); creating new products or resources (29.2%) was second. In the disagree category, transforming respondents' own learning was highest (12.5%), while creating new products and resources ranked next (8.3%). Transforming others' learning was first (20.8%) and creating new products or resources and transforming respondents' own learning were second in the strongly disagree category. Finally, there was only one rating in the no response category; this was creating new products or resources (8.3%).

Settings summary.

The setting summary presents the two highest percentages for each category of the Likert scale used for assessing respondents' level of agreement with statements about liking to use emergent technologies in school, work, and home or other informal settings (Figure 12).

Starting with the strongly agree category, respondents rated creating new products and resources first (54.2%), while solving problems and transforming others' learning in work settings ranked second (50.0%). There was a three-way tie for highest ranking in the agree category: solving problems in the work and home settings, and transforming respondents' own learning in the school setting (50% each). Solving problems in the school setting ranked second (45.8%) in the agree category. In the neutral category, creating new interactions with others and transforming others' learning in the home setting ranked highest (41.7%), while creating new products and resources in the home setting, and creating new ways to interact with others in the school setting were second (29.2%). Transforming respondents' own learning in the home setting ranked highest (12.5%) in the disagree category; creating new products and resources in the home environment, as well as transforming the respondents' own learning and transforming others' learning in the work environment ranked second (8.4%). In the strongly disagree category, transforming others' learning in the home setting was highest (20.9%); creating new products or resources and transforming respondents' own learning in the home setting were second (12.5%). Only two statistics were found in the no response category. The highest ranking was for creating new products and resources in home and workplace settings (8.3% each).

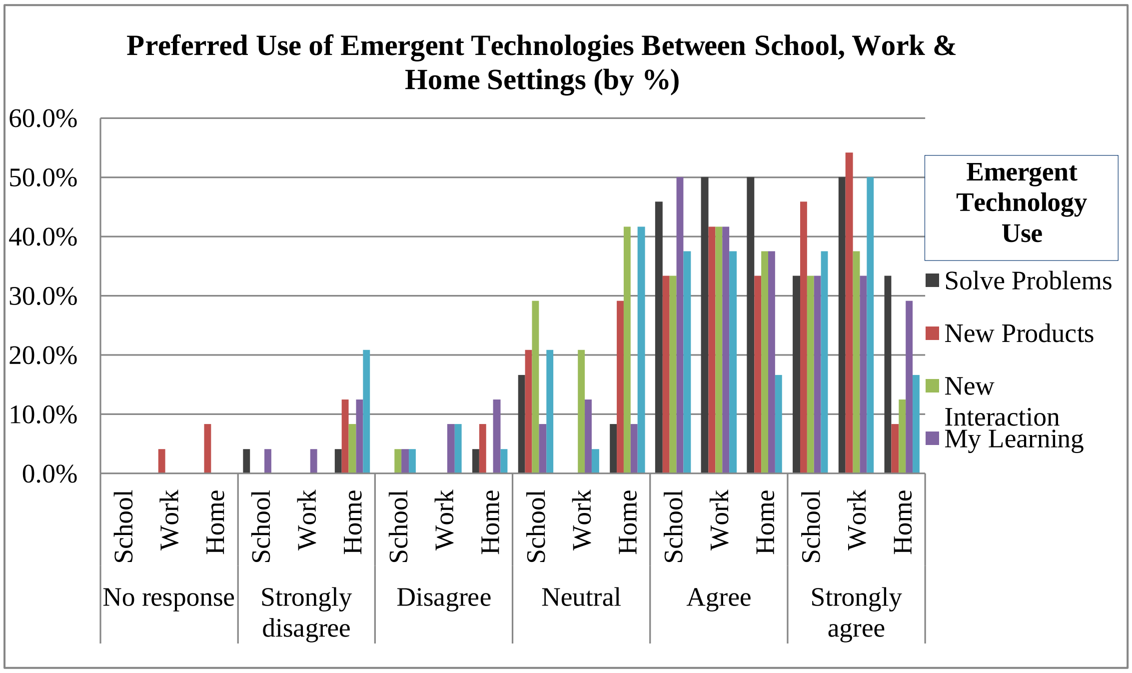


Figure 12. A summary of pre- and post-term responses rating level of respondent agreement on how they like to use emergent technologies in school, work, or home-based and other informal settings (using a Likert scale where 0=no response, 1= strongly disagree, 3=neutral, and 5=strongly agree. Results are reported by percent).

The last quantitative section of the pre- and post-term questionnaires focused upon the final element of the omni-tech taxonomy researched in this dissertation, reflective thought.

Reflection, critical reflection, reflexivity.

This section on reflection, critical reflection, and reflexivity gathered quantitative data intended to provide some insight into the relationship between learner perceptions and experiences with emergent technologies. Study participants were asked to identify their level of agreement with statements on what their thoughts typically focused upon when reflecting on experiences with new technologies. Statement areas included: (1) efficiency, (2) effectiveness, (3) employment of the technology in various settings, (4) impact on social structures, (5) impact on learner access to knowledge, and (6) transformation of the respondents' own learning. These statements were rated on a Likert scale, where 0=no response, 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. The first statement considered was about efficiency.

Respondents were asked to indicate how much they agreed with the statement, "When I reflect upon my experiences with a new technology, typically my thoughts focus upon how the technology impacts the efficiency of school, work, or personal task completion (e.g., does the technology save or waste time?)." Nearly half of the respondents (45.8%) reported that they strongly agreed, 29.2% agreed, and 16.7% indicated neutrality with this statement. A final 4.2% of respondents disagreed, or provided no response to the statement.

When asked to rate their level of agreement to the statement about their thoughts focusing upon the effectiveness of a new technology for school, work, or personal task completion (e.g., did the technology produce better quality end products?), 62.5% of the respondents strongly agreed, 25.0% agreed, and 12.5% expressed neutrality with this statement.

Participants were then asked to rate their level of agreement with the statement that their thoughts typically focused upon how the technology was being used by their class, organization, or social group. Results showed that 54.2% of the respondents reported strong agreement, while 33.3% agreed, 8.3% expressed neutrality and 4.2% disagreed with this statement.

Respondents were next asked to rate their level of agreement with the statement that their thoughts typically focused upon how a new technology impacted the social structure of their class, school, organization, or social group. Two-fifths (41.7%) of the respondents indicated that they were neutral about the statement that their thoughts usually focused upon how a new technology impacted these social structures. Of the remaining respondents, 33.3% strongly agreed, 12.5% agreed, 8.3% disagreed, and 4.2% strongly disagreed with this statement.

The fifth statement in this section required respondents to rate their level of agreement with the comment that when they reflected upon a new technology their thoughts typically focused upon how this technology could impact learner access to knowledge. Nearly two-thirds (62.5%) of the respondents strongly agreed, 33.3% agreed, and 4.2% expressed neutrality with this statement.

The final statement that respondents were asked to rate their level of agreement with was about whether they typically reflected upon how the technology might transform their own learning when using a new technology. Results show that 45.8% of the respondents strongly agreed, 29.2% agreed, 12.5% indicated neutrality, 8.3% disagreed, and 4.2% strongly disagreed with the statement that their thoughts typically focused upon how a new technology might transform their learning.

Summary.

Aggregation of pre- and post-term data for both courses on the six statements used to measure reflective, critically reflective, and reflexive thoughts that study participants typically had when using a new technology indicated that 62.5% of these participants strongly agreed that they most often thought about how effective the technology was or how it impacted learner access to knowledge (Figure 13). The second highest rating in the strongly agree category was for how the technology was being used by the respondents’ class, school, work, or social group. In the agree category, how the technology was being used and how it impacted learner access to knowledge were most highly rated (33.3%), while reflections on efficiency and how the technology transformed the way that respondents learned ranked second (29.2%). How the new technology impacted the social structure of the respondents’ class, school, organization, or social group was ranked highest (41.7%) in the neutral category, followed by efficiency (16.7%). Only four statistics were found in the disagree category; 8.3% of respondents disagreed that their thoughts typically dwelled upon how a new technology transformed the way that they learned, or how it impacted social structures. A further 4.2% disagreed that they typically thought about how efficient the technology was or how it was being used by their class, school, organization, or social group. Results in the strongly disagree and no response categories were negligible.

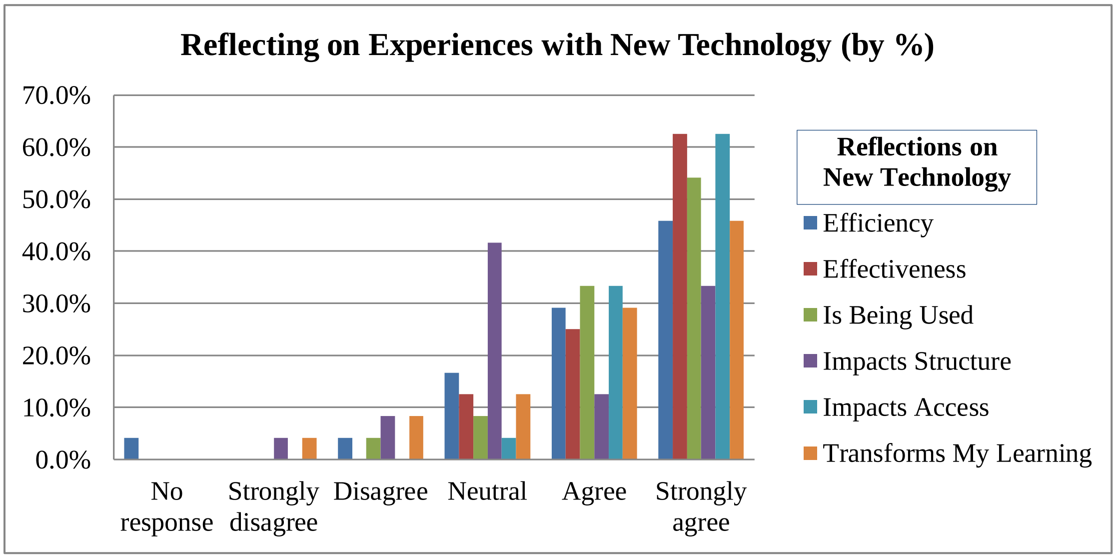


Figure 13. A summary of pre- and post-term responses rating level of respondent agreement about what thoughts they typically reflect upon when working with new technologies (using a Likert scale where 0=no response, 1= strongly disagree, 3=neutral, and 5=strongly agree. Results are reported by percent).

Summary of quantitative results.

Most sections on the pre-term questionnaire were also found in the post-term questionnaire. Likert scales were used to measure respondents' level of agreement with statements about or their levels of perceived competency with emergent technologies. A few questions asked respondents to select one choice from among a number of options.

The questionnaires differed slightly. The pre-term questionnaire asked respondents to provide some demographic information; the post-term questionnaire included questions on respondents' perceptions on the amount of emergent technology integration scaffolding and learning curve that they experienced during the term. The pre-term questionnaire also asked respondents to indicate if they planned on setting a personal technology integration goal for the term, while the post-term questionnaire asked if they had worked on this goal during the term.

Due to the small number of participants in the study (n=12), quantitative results from these questionnaires are not statistically significant. As discussed in Chapter 4, the intention of these questionnaires was to verify, enrich, and extend the qualitative study data, as well as to test the operationalization of the omni-tech taxonomy conceptual variables before being used in a quantitatively statistically-significant study. With this in mind, a few highlights from each section are presented herein.

Demographically, 35.3% of students from the two Spring 2017 MEd DE courses joined the study. Most participants were females (75%) between the ages of 50-54 (33.3%) and lived in a large urban setting (population > 500,000). Before the term started, they had completed five to six courses (42%).

Highest and lowest ranking results from each of the four innate drives and reflection data are presented next, starting with autonomy.

The pre- and post-term questionnaire section on autonomy centred on three topic areas: course decisions, learning about new technology, and learning situations. The first topic, course decisions, was broken into two sub-sections: who currently made most decisions about the MEd DE program and the courses involved in this study, and who should make most of these decisions. Cumulative results indicated that most decisions were currently made by the instructor (36.5%) and the least number by the government (0.9%). Respondents thought that 38.4% of most decisions should be made by the student and instructor, while the government should make the least decisions (0.5%).

The second area in the autonomy section explored the emergent technology instructional resources respondents felt they learned the best from. Fifty percent of all respondents reported that they learned best from trial and error. One third of respondents thought that the worst learning resources were younger children, family, friends, or the instructor.

The third area of data collected on autonomy was on what learning situations respondents perceived they learned best in. Seventy-five percent indicated that they most preferred to learn alone. They least preferred to learn in MOOCs (25%); 37.5% declined to rate their ability to learn in MOOCs.

Data on the innate drive for purpose was gathered next. Sub-areas in this section included: (1) setting and working on a personal technology integration goal during the term under study, (2) scaffolding, (3) learning curve, and (4) emergent technology integration aims.

The pre-term questionnaire asked respondents if they had voluntarily set a personal emergent technology goal for the term under study. Seventy-five percent indicated that they had, 16.7% had not, and 8.3% weren't sure. When respondent were asked on the post-term questionnaire if they had worked on this goal during the term, 58.3% said no and 41.7% affirmed that they had.

Respondents were then asked to rate their level of agreement on the post-term questionnaire to statements about requiring more learning support (scaffolding) and experiencing a greater learning curve than classmates when learning about emergent technology integration topics in the course. Fifty percent of the participants strongly disagreed and no one agreed that they required more scaffolding than their classmates. When asked to rate their level of agreement to experiencing a greater learning curve, the highest ranking indicated that 25% either strongly disagreed or disagreed with the statement. The lowest learning curve rankings were in the agree and no response categories (8.3% each).

The final purpose sub-section asked participants to rate their level of agreement with statements about various economic, social, and altruistic aims for integrating emergent technologies on an ongoing basis into their school, work, and personal lives. Results indicated that 45.8% of participants strongly agreed that economic aims were important; no one disagreed with this statement. When asked how much they agreed with the statement that perpetually integrating emergent technologies was important to achieve social aims, the highest ranking result was found in the agree category (33.3%), while the lowest rankings were found in the strongly disagree or neutral categories (12.5% each). Levels of agreement about the importance of perpetually integrating emergent technologies for altruistic aims indicated that most respondents expressed neutrality

(41.7%), while the lowest ranking showed that no respondents disagreed, strongly disagreed, or declined to respond to the statement.

Two areas were explored in the innate drive of mastery section: competency with emergent technologies, and primary technology integration goal.

When participants were asked to rate their perceived levels of competency with 16 different emergent technologies, results indicated that the highest ranking in the capacity category was for online LMSs (53.2%). Seventy-five percent of respondents were least competent with 3D printing technologies.

The most important technology integration goal for respondents was to transfer knowledge to new situations (33.3%); the least important goal was to become as competent as their peers (4.2%).

The final innate drive explored on the questionnaires was innovation. In this section, respondents were asked to rate their level of agreement to statements about liking to integrate technologies for various reasons in school, work, and home or informal social settings. A summary of these results indicated that respondents most strongly agreed that they liked to create new products or resources at work. The highest ranking in the strongly disagree category was transforming their own learning in home and informal settings (12.5%).

The final quantitative section of the questionnaires asked respondents to indicate their level of agreement with statements that they most often reflected on: (1) efficiency, (2) effectiveness, (3) how the technology is being used by others, (4) impact on social structures, (5) impact on learner access, and (6) transformation of the respondents’ way of learning when using a new technology. Most respondents (62.5%) strongly agreed that their reflections typically focused upon the effectiveness of the new technology or how it impacted learner access to knowledge. Results in the strongly disagree category were negligible. Highest disagree category rankings were with thinking about how the new technology could transform the way that respondents learned or how it might impact social structures (8.4%).

The second section of this chapter focuses upon qualitative results obtained from mid-term and post-term interviews with all study respondents.

Qualitative Results

The discussion on qualitative results begins with an overview of interview scripts, coding reliability and agreement, and coding framework, and then moves on to coding results.

Interview scripts.

Study respondents (n=12) were provided with a copy of the interview script approximately two weeks before the recorded telephone interview date. They were then sent a transcription of the interview to edit and verify; data from the verified results are reported herein.

The mid-term and post-term interview scripts were almost identical. Both asked respondents to identify the key institutional, curricular, instructional, and other learning environment factors that most empowered them to integrate emergent technologies on demand, and why they thought that. Next, respondents were asked who should hold the greatest responsibility for teaching them to integrate emergent technologies on demand now and in the foreseeable future, and why. Participants were then asked what government, institutional, curricular, instructional, or learning environment changes they thought were needed to help them integrate these technologies, given the state of flux that emergent technologies and learning environments are currently in. Lastly, they were asked for other observations or comments they might like to make about integrating emergent technologies for learning on demand, before being invited to add any questions or comments about the interview or this research project.

The first question on the mid-term interview script asked respondents who had set a personal technology integration goal for the term if they thought that the first assignment would help them to achieve this goal. It then asked them to identify any other aspects of the MEd DE program or the course that they had been recruited from for this study that might help them to achieve this goal.

The first question on the post-term interview script asked respondents who had set a technology integration goal for the term if the first assignment had helped them to achieve this goal. The question went on to ask if participants had revised their plans after completing the assignment, and what other aspects of the program or the course helped them to reach their goal. Finally, participants were asked if they had achieved or changed their goal, or set a different goal as a result of having taken the course.

The other unique question on the post-term interview script asked participants if their ideas about the key factors that most empowered them or other learners to integrate emergent technologies on demand had changed as a result of having completed the course.

Mid-term and post-term results were gathered from seven Course A respondents and five Course B respondents; this yielded a total of 24 individual interview transcripts.

Coding reliability and agreement protocols were established to develop an effective coding framework and obtain reliable coding results. A review of these protocols and related processes is next.

Coding reliability and agreement.

This section contains two sub-sections. The first subsection provides definitions for coding reliability and agreement terms, as well as rationales for establishing coding protocols for this study. The second sub-section describes the coding process employed in the study and offers statistical results for this coding process.

Establishing coding protocols.

Qualitative results were compiled using *coding*, which Cohen, Manion, and Morrison (2011) defined as a process in which respondent information and responses are sorted into descriptive categories. Qualitative data coding was done with NVivo Pro 11 v.23 and Excel 2010 software. A second coder was employed to help ensure that: (1) reproducibility between coders, or *inter-coder/inter-rater reliability*, was established, and (2) *stability/intra-rater reliability*, or the accuracy of coding over time, was maintained (Campbell, Quincy, Osserman, & Pedersen, 2013; Krippendorff, 2004; Stemler, 2013). Another step in the coding process was to determine the unit of analysis.

According to Rourke, Anderson, Garrison, and Archer (2001), a coding goal is "to select a unit that multiple coders can identify reliably, and simultaneously, one that exhaustively and exclusively encompasses the sought after construct" (p. 17). Moreover, the unit of analysis should fit with the research questions, theoretical framework, models, and methodology employed in the study (Garrison, Cleveland-Innes, Koole, & Kappelman, 2005). Fahy et al. (2000) and Hillman (1999) selected the syntactical unit of the sentence to assist in the development of easy-to-use and reliable instruments. Although both studies reported high levels of inter-coder reliability (with Fahy et al. reporting 94% agreement, and Hillman a Kappa agreement of 0.96), Rourke et al. (2001) felt that this unit of analysis was not reliable for coding their online conference transcripts because identification of a sentence unit could be open to coder interpretation, and could yield thousands of units.

While coding telephone interview scripts alone or with second coders for previous studies using a variety of established and untested frameworks (for example, Ally, Cleveland-Innes, & Wark, n.d.; Ally & Wark, 2017; Anderson, Annand, & Wark, 2005; Anderson & Wark, 2004), this researcher found the sentence unit to be the easiest and most accurate coding unit to identify and employ to help answer the questions at hand within the context of these studies. Therefore, with recommendations by Garrison's (2005) and Fahy's teams, the researcher's previous coding experience, and the goals of the current project in mind, the sentence was chosen as the unit of analysis for this dissertation.

Two coding calculations were used to determine the level of inter-coder reliability among the interview transcript samples chosen for this purpose. The first was simple percentage agreement, calculated by subtracting the percentage of units that the coders did not agree upon from the total number of coded units for each sample. Although no golden rule for choosing a particular method of calculation or determining reliability thresholds for agreement using the percentage method (Campbell et al., 2013) was found in the literature, some guidance was offered. To illustrate, Hodson (1999) thought that 79% inter-coder agreement indicated a ‘‘relatively high degree of reliability” (p. 51). Fahy (2001) proposed that 70% to 90% presented a continuum from acceptable to exceptional agreement for conference transcript analysis. Kurasaki (2000) established that 70% agreement during coder training, and 94% during independent coding were acceptable when coding open-ended interviews for her research. Nevertheless, scholars such as Hruschka et al. (2004) and Krippendorff (2004) posited that looser standards could apply to exploratory studies.

The second inter-rater reliability calculation employed was Cohen’s Kappa coefficient, which is used to calculate inter-coder agreement on nominal scale data (McHugh, 2012). The Kappa coefficient attempts to factor in the possibility of coders randomly selecting an identical code as opposed to purposively selecting it based upon shared logic or mindset. According to McHugh, Cohen indicates that “Kappa result[s should] be interpreted as follows: values ≤ 0 as indicating no agreement and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement.”

In the following section, the inter- and intra-rater reliability coding process for this study is explained and resulting coding reliability and agreement statistics are given.

Coding process and results.

The first mid-term interview conducted was purposively selected to be coded together by the researcher and second coder. Once the initial coding scheme and related descriptors had been established through this process, the second interview conducted was coded together to test and edit the coding scheme and descriptors. The first sample contained 122 units; the second had 111 units. One hundred percent coding agreement and 1.0 Kappa coefficient were calculated for both samples.

After the coders were satisfied with the coding scheme and descriptors, the third interview conducted was purposively chosen. This interview was initially coded independently by the coders. Coding agreement was then calculated (331 coded units yielding 97.6% and 0.952 Kappa results). A second round of coding, aimed at achieving coder agreement with previously disagreeing units, resulted in 337 coded units with 99.4% agreement/0.988 Kappa. Finally, a third round was undertaken to resolve the remaining disagreeing units. This produced 339 units with 100%/1.0 Kappa results for this sample.

Two more interviews were then randomly selected to be coded by each coder in isolation. After each interview was coded in this manner the coders met, identified coding discrepancies, and edited the coding scheme and coding descriptions as discrepancies were negotiated and reconciled to reach the highest possible inter-coder agreement (Campbell et al., 2013; Garrison et al., 2005). The researcher then went on to code the remaining mid- and post-term transcripts alone (N=19; 79.2%). To address the issue of intra-rater reliability, the second coder then randomly selected one of these latter transcripts (it was the 18th transcript coded only by the researcher) and coded it in isolation. These second coder's codes were then compared to the researcher's coding for this final sample. Results from this last sample indicated that from 87 units, 93.6%/0.985 Kappa agreement levels were reached after the first round of independent coding. The second round produced 93 units with 100%/1.0 Kappa agreement.

In total, 25% of all interviews were co-coded. All sample interview units (N=854) were agreed upon when the co-coding process was finished. The average number of units per sample was 161, with 97.2% and 0.983 Kappa agreement averages. Calculations for round one of independently-coded sample averages yielded 92.4% and 0.956 Kappa levels of agreement from 146 units. Recoding of previously disagreeing units during rounds two and three among independently-coded samples produced an average total of 192 agreeing units with 99.9% and 0.997 Kappa agreement results (Table 2).

Table 2

Inter- and Intra-coder Reliability Results

			Coder Agreement		
Sample	Notes	Round	# of Units	%	Kappa
[a] 1	Purposive; co-coded	1	122	100.00	1.000
[a] 2	Purposive; co-coded	1	111	100.00	1.000
[a] 3	Purposive; independently coded	1	331	97.64	0.952
		2	337	99.41	0.988
		3	339	100.00	1.000
[a] 4	Random; independently coded	1	104	84.55	0.918
		2	123	100.00	0.999
[a] 5	Random; independently coded	1	62	93.93	0.970
		2	66	100.00	1.000
[b] 6	Random; independently coded	1	87	93.55	0.985
		2	93	100.00	1.000
Totals		11	[c] 1775	1069.08	10.81
Mean: All		1	161	97.19	0.983
Mean: Rd 1	Independ. coded only	1	146	92.42	0.956
Mean: Rd 2&3	Independ. coded only	1	192	99.88	0.997
Sample Size	All: 6/24 = 25%; Independently coded = 4/24; 17% of total interviews				

[a] Used to determine inter-coder reliability; [b] used to determine intra-coder reliability; [c] final round totals only = 854 units.

Coding framework.

The broad categories for the coding framework were pre-determined by the researcher, based upon the study questions. While co-coding the first two samples, the researcher and second coder created additional sub-codes, or *child* codes, under these broad, or *parent* codes. To illustrate, part of one research question asked respondents to identify the key instructional factors that most empowered them to perpetually integrate emergent technologies for learning. The pre-determined parent code for this factor was “instructional factors.” Under this parent code, themes like “activities,” “assignments,” and “instructor” were identified in the transcripts during the coding process; each of these became child code categories. Each child code was further sub-divided into “encouraging,” “lack of,” and “neutral” under the code, “empowerment.” In rare cases, further sub-themes were identified under certain encouraging, lack of, and/or neutral codes; for instance, “relevancy” was a re-occurring theme under the “instructional factors/assignments/empowerment/encouraging” coding branch.

Eleven parent codes were established in the coding framework. Eight were used to categorize responses to the research questions. Seven of these were used for mid- and post-term coding purposes (a personal emergent technology goal; curricular, environmental, government, institutional, and instructional factors; and responsible for learning); the other one was for the post-term (change in thinking). Of the remaining three parent codes, one was for collecting comments about the research project (study comments), one was for storing some samples of different conceptions for the term, “technology” among respondents (x-concept of tech), and a final one was for holding sentences that did not appear to belong to any other category (uncoded). During the coding process, it was recognized that some sentences belonged to more than one code category; such sentences were added to all pertinent codes.

Mid- and then post-term coding frequency results, along with cumulative summaries for all mid- and post-term respondent data results are presented next. These results are organized under headings for each parent code. (The name of each code is italicized when it is first introduced to help readers identify it as a code.) Numerous third, fourth, and occasionally, fifth generation child codes are identified within some parent codes. To remain as parsimonious as possible, any generation of a child code category that yielded a negligible frequency of units is not included in the following discussion. Nevertheless, frequency results for all coded units are available upon request.

A personal emergent technology goal.

The first mid- and post-term interview question explored participants' voluntarily-set personal emergent technology goals for the term under study.

Mid-term.

There were 133 mid-term units found in the parent *personal emergent technology goal* code category. The interview question for this section was divided into two sub-questions.

The first sub-question asked respondents who had indicated that they had an emergent technology integration goal on the pre-term questionnaire if the *first course assignment* might help them achieve that goal. A total of 29 units were recorded; 13 in the *yes*, and 16 in the *no* category.

Respondents were then asked to identify any *other MEd DE program or course aspects* that might help them to achieve their personal emergent technology goal. Eighty-six units were counted in the other aspects coding category. Child codes in this category included: the *course*, the *program*, *other assignments*, and *other learners*. Each of these child codes was further divided into *yes* or *no* categories. Thirty-two units were coded to the course; 27 were yes and five were no. Another 31 were coded to the program; 26 were yes and 5 were no. All 20 units in the other assignment category were coded yes. Finally, other learners contained three yes units.

The third main child code identified in mid-term interviews was *setting an emergent technology goal* for the course. This code was sub-divided into *yes* and *no* child codes. Eighteen units were included in this main child node; 13 were yes and five were no. To illustrate, one comment coded to the no category was, "No, [I didn't set a goal because] this isn't a technology course."

Post-term.

Participant responses to four questions about setting a voluntary personal emergent technology goal for the term were sought during the post-term interview. Those who indicated that they had set such a goal were asked: (1) if the first assignment helped them to achieve the goal, (2) if they revised their plan after completing this assignment, (3) what other program or course aspects helped them achieve the goal, and (4) whether they had achieved or changed their goal as a result of having taken this course. A total of 82 post-term personal emergent technology goal units were coded.

Fifteen units were recorded in the *set an emergent technology goal* category; ten were *yes*, and five were *no*.

Three units were coded to *no* and two to *yes* in response to the question about the *first assignment* helping participants to achieve a personal emergent technology goal. Eleven units were coded to the first assignment code, *changed plan.* Five of these units were *empowerment* units, which were further divided into four *encouraging* units and one *neutral* unit.

The *other aspects* category yielded 51 units. Twenty-eight units were assigned to *course* which, in turn, were further separated into ten *yes* and seven *no* units, and 11 *changed goal* units. The changed goal units were sub-divided into *empowerment* (*encouraging, lack of,* or *neutral*) and *yes* or *no* changes. Within this changed goal category, four yes and two no, as well as five encouraging units were found. Under *program*, there were four yes and two no units, and four changed goal units. Three of the changed goal units were empowering; of these, two were encouraging units and one was a neutral unit. Of the 13 *other assignment* units, five were yes and, in the changed goal sub-category, four were yes, one was no, and three were encouraging units.

Summary.

In total, there were 215 mid- and post-term units assigned to the personal emergent technology goal section of the coding framework. Twenty-three were identified in the yes and ten in the no categories; these units contained responses about whether respondents had set personal emergent technology goals during the term or not. Forty-five units related to how the first assignment may have affected the setting and development of this goal. Some of these first assignment units were about whether the assignment had helped respondents to achieve their emergent technology goal or not. In response to this, 18 yes and 10 no units were recorded. The remaining 11 first assignment units were sorted into the changed goal sub-section.

The other aspects section included 137 units, separated into 60 course, 41 program, 33 other assignment, and three other learners. There were 37 yes, 12 no, and 11 changed goal units within the course subsection. The program subsection produced 30 yes, seven no, and four changed goal units. The other assignment subsection yielded 25 yes and eight changed goal units. Finally, other learners contained three yes units.

Curricular factors.

One mid- and post-term question sought to ascertain respondent perceptions on what key MEd DE curricular factors empowered them to integrate emergent technologies for learning on demand, why these factors empowered them, and what changes may be needed to ensure that the respondents, as well as other learners, would be able to continue to integrate emergent technologies in the future.

Resultant coding categories included *changes, choice, empowerment, course, program, no factors identified*, and *the Landing*. The main program category was separated into: *accessibility, collaboration, course design, e-Book, e-Portfolio, LMS, multimedia, pace*, and *relevancy*. The changes category also included *program changes*, which was further sub-divided into *course design, currency and Pro-D, forums, hands-on, integration, multi-discipline, multimedia,* and *relevancy*. Each terminal category contained a final empowerment sub-category, which was broken into *encouraging, lack of*, and *neutral* sub-sections. The program/LMS category also included a *forum* sub-section. Given the breadth and depth of all coding categories, only highest unit counts are reported herein.

Mid-term.

There were a total of 229 curricular factor units recorded from mid-term interviews. Of these, 60 belonged to the changes, four to the choice, eight to the course, and 151 to the program categories. The highest number of units in the changes category was found in the program changes/encouraging section (N=51 units). For example, one respondent said, "The biggest change would have to be ongoing curriculum redesign, or ongoing tweaking of content, in order to keep it highly relevant and current."

In the program category, 41 encouraging, 20 lack of, and eight neutral units were coded to the main empowerment sub-category. The next highest count of units in the program category was found in the LMS sub-category; 16 units were encouraging, ten were lack of, and one was neutral. The third-highest count came from the course design sub-category, with six encouraging and six lack of units, and one neutral unit.

Post-term.

There were 128 units coded to post-term curricular factors. Thirty-seven units were sorted into the changes, nine to the choice, four to the empowerment, 11 to the course, and 66 to the program categories, as well as one to the no factors category. Thirty-two of units in the changes category were in the encouraging category. In the program category, 22 course design units were further sorted into nine encouraging, seven lack of, and six neutral units. Twenty-one more program units were divided into 18 encouraging and two lack of units, and one neutral unit under the general curricular empowerment code. The final 18 program units were under relevancy (15 encouraging and three lack of units).

Summary.

There were 357 units coded to the mid- and post-term category, curriculum factors. Ninety-seven came from the changes, 13 from the choices, four from the empowerment, 19 from the course, 217 from the program, two from the no factors, and 5 from the Landing categories.

Of the 97 changes units, 84 were located under program changes/empowerment. Within this sub-category, 72 encouraging units were found. These encouraging units were further separated into numerous smaller categories. Among these, relevancy contained the most units (N=13 units); this was followed by integration (N=12), course design (N=10), and currency and Pro-D (N=8). Of the remaining program changes/ empowerment units, nine were lack of, and three were neutral.

In the curricular factors/program category, the top four frequencies were found in empowerment (N=90 units), course design (N=35), LMS (N=31), and relevancy (N=30). Within the empowerment sub-category there were 59 encouraging units, 12 of which were further sorted into a *mobile learning course* sub-section. The remaining empowerment units included 22 lack of and nine neutral units. Under course design, there were 15 encouraging, 13 lack of, and seven neutral units. Within the LMS category, there were 20 encouraging units; ten were further sorted into *forums*, three into *accessibility*, and one into *Adobe Connect*. The remaining LMS units were found in the lack of (N=10) and neutral (N=1) sub-sections. Finally, there were 23 encouraging and six lack of units, as well as one neutral unit in the relevancy category of curricular factors.

Environmental factors.

One of the questions on the mid- and post-term questionnaires asked respondents to identify the formal online school, workplace, or personal learning environment factors that most empowered them to integrate emergent technologies for learning on demand. Respondents were then asked why these factors empowered them. Finally, they were asked what environmental factor changes were needed to enable learners to perpetually integrate emergent technologies for learning on demand in the future. Some did not report exclusively upon online school factors as asked, but rather expanded their responses to include traditional face-to-face school environments as well. Thus, the *formal online school* code was re-labeled to *formal school* to accommodate respondents' broader schooling references.

Responses were sorted into six main categories: *accessibility, changes, formal school*, *personal learning environment* (*PLE*), and *workplace*. All of these categories included an *empowerment* sub-category. Formal school also contained its own *changes* sub-category. Other personal learning environment sub-categories identified from the data were *family*, *self*, *social groups*, and *social media*. Lastly, workplace also contained the sub-categories of *accessibility, assessment, colleagues, currency and Pro-D, personal technology goal*, and *students*. Given the breadth and depth of all coding categories, only highest unit counts are reported herein.

Mid-term.

There were 310 mid-term units designated to the environmental factors section of the coding framework. These units were further sub-divided into accessibility (N=2 units), change (N=3), formal school (N=39), personal learning environment (PLE; N=138), and workplace (N=128). Most formal school units were found in the empowerment sub-category (N=31); these included 15 encouraging, 13 lack of, and three neutral units. Most units in the PLE category were found in the sub-category, self (N=63). Within this sub-category, self-motivation units ranked highest (N=16) and currency was second (N=13). Empowerment ranked highest (N=42) in the workplace category, with a count of 28 encouraging, eight lack of, and six neutral units. Currency and Pro-D ranked second (N=27), with two neutral, three lack of, and 22 encouraging units. The third-highest unit count in the workplace category was found under students (N=21), with 17 encouraging and three lack of units, and one neutral unit.

Post-term.

A total of 322 post-term units were allocated to environmental factors. These units were further divided as follows: seven to accessibility, 19 to changes, 53 to formal school, 105 to PLE, and 138 to workplace sub-categories. The greatest number of units in the formal school sub-category was found under empowerment, which contained 19 encouraging, 20 lack of, and four neutral units. The highest number of units were found in the PLE sub-category, self (N=79). The greatest number of units in the self sub-category were located under self-motivation (N=17; all were encouraging units). To illustrate, one respondent said, “Also, the more I know about mobile learning, the more I become curious about the pedagogy of learning. I found that that was a huge aspect of wanting to integrate emergent technologies for myself and especially for my students.”

The second largest number of self sub-category units were under relevancy (N=20; 18 encouraging units, one lack of, and one neutral unit). Finally, in the workplace sub-category, most units were found under currency and Pro-D (N=45, with 31 encouraging, 11 lack of, and three neutral units). The second greatest collection of workplace units was under empowerment (N=29; 17 encouraging, nine lack of, and three neutral units).

Summary.

A summary of all mid- and post-term results showed a total of 632 environmental factor units. Of these, 9 were allocated to the accessibility sub-category; 22 to change, 92 to formal school, 243 to PLE, and 266 to workplace. Highest unit frequencies within formal school were found under empowerment (N=77; 37 encouraging, 33 lack of, and 7 neutral units). The second highest number of formal school units was under change (N=15; 12 encouraging, 1 lack of, and 2 neutral units). Most PLE units were found under self (N=142). Within self, the highest number of units were located under self-motivation (N=37; 34 encouraging and 3 lack of units), and then relevancy (N=27 units; 25 encouraging, one lack of, and one neutral). The second highest number of units in the PLE sub-category belonged to social groups (N=26; 28 encouraging, 2 lack of, and 6 neutral units). Finally, the highest unit groupings in the workplace sub-category were in currency and Pro-D (N=72; 53 encouraging, 14 lack of, and 5 neutral units). The second highest number of units was in empowerment (N=71 units; 45 encouraging, 17 lack of, and 1 neutral). Third was students (42 units; 35 encouraging, 5 lack of, and 5 neutral), and fourth was colleagues (N=41 units; 27 encouraging, 12 lack of, and 2 neutral).

Government factors.

During mid- and post-term interviews, participants were asked to identify what government changes they thought were needed to help learners continue to integrate emergent technologies for learning now and in the future, given the state that emergent technologies and learning environments were in at the current time. Four sub-categories were identified within the resultant government factors category: *changes, funding, policies*, and *practices*. The changes sub-category was further divided into *accessibility, empowerment, growth, policies*, and *practices*. Policies and practices were broken down into *empowerment* and *funding*. Only highest unit frequencies in the changes sub-category were reported here, as the remaining sub-categories contained negligible quantities of units.

Mid-term.

There were 67 mid-term units in the government factors category; 62 units were in the changes, two in the policies, and three in the practices sub-categories. Highest unit counts within the changes sub-category were found in policies (N=17); of these, 15 were further sorted into funding (two lack of and 13 encouraging units). For instance, one mid-term lack of funding comment was, “It is also government - to realize the need to continue growth in this area and to provide budget for that.” The second largest number of units in the changes sub-category were under practices (N=15), with funding containing 11 of these units (9 encouraging and two lack of units).

Post-term.

Thirty-three of the 45 post-term government factors units were found in the changes sub-category; the remaining units were divided among funding (1 unit), policies (5 units), and practices (6 units). Practices contained the most units (N=15 units) in the changes sub-category. These practices units were sub-divided into eight empowerment units (5 encouraging, 1 lack of, and 2 neutral), and seven encouraging funding units. The other high unit count was in policies (N=13); six were encouraging funding units, six were encouraging empowerment units, and one was a lack of empowerment unit.

Summary.

There were a total of 112 mid- and post-term units assigned to the government factor category. These were separated into the changes (N=95 units), funding (N=1), policies (N=7), and practices (N=9) sub-categories. Within the changes sub-category there was an equal division between the two highest unit count groupings, policies and practices (N=30 units each). Policies contained 21 funding units (19 encouraging and two lack of) and 9 empowerment units (eight encouraging and one lack of). Practices contained 18 funding units (16 encouraging and two lack of), and 12 empowerment units (eight encouraging, two lack of, and two neutral). Remaining change sub-groups, as well as funding, policies, and practices sub-categories contained negligible numbers of units.

Institutional factors.

Another mid- and post-term interview question asked interviewees to identify what key AU university *institutional factors* empowered them to integrate emergent technologies for learning on demand and why these factors empowered them. As part of another question, respondents were also asked what changes they thought were needed to help other learners and them to continue integrating emergent technologies now and in the future. The coding results for responses to these questions led to the identification of four main sub-categories: *changes*, *no factors identified, policies*, and *practices*.

The sub-category, changes, was sub-divided into: *assessment, administration, empowerment, funding, instructor Pro-D, LMS,* and *mobile learning*. Policies sub-divisions were: *assessment, applications, course requirements, cross-platform, e-book, empowerment*, and *LMS*. Practice sub-divisions included: *assessment, applications, cross-platform, currency, e-book, empowerment, funding, instructor Pro-D, learning engagement, library, LMS,* and *relevancy*. *Empowerment* was further sub-divided into *encouragement, lack of,* and *neutral* within all sub-categories. Sub-category coding results in this discussed section included code groupings with highest unit counts.

Mid-term.

There were a total of 173 mid-term units accounted for in the institutional factors category, divided among the sub-categories as follows: 62 in changes, three in no factors identified, 19 in policies, and 89 in practices. In the changes sub-category, most units were found under empowerment (N=13 units; nine encouraging, two lack of, and two neutral). Currency contained the second most units (N=12), with seven encouraging and five lack of units. The highest number of units in the practice sub-category were in empowerment (N=26 units; 15 encouraging, nine lack of, and two neutral), while the second highest number was in LMS (N=25 units; 19 encouraging, four lack of, and two neutral).

Post-term.

Post-term results for instructional factors yielded a total of 119 units; 39 in the changes, 23 in the policies, and 57 in the practices sub-categories. Under the sub-category of changes, the two highest unit frequency counts were found in empowerment and currency. Empowerment was divided into seven encouraging units, as well as one lack of, and one neutral unit. Currency was divided into seven encouraging units and one lack of unit. In the practices sub-category, the highest number of units was in accessibility (N=15 units; 12 encouraging, two lack of, and one neutral). One encouraging accessibility comment was, "When I think about how I had to, every fall, pack up my gear and textbooks in my truck and travel across the country, find a place to live, all of this kind of stuff, and how difficult and costly it was, now I can go online and eliminate all of that stuff." The second highest number was in LMS (N=13; 12 encouraging and one neutral).

Summary.

Of the 292 mid- and post-term interview units sorted into the institutional factors category, 101 were located in the changes, three in the no factors identified, 42 in the policies, and 146 in the practices sub-categories. The greatest numbers of units in the changes sub-category, reported from highest to lowest, were in empowerment (N=22 units; 16 encouraging, three lack of, and three neutral), currency (N=20; 14 encouraging and six lack of), accessibility (N=18; 15 encouraging, two lack of, and one neutral), and instructor Pro-D (N=17; 16 encouraging and one lack of). The largest quantity of units in the policies sub-category were found in e-book (N=17 units; 12 encouraging, one lack of, and four neutral). This was followed by empowerment (N=11 units; 3 encouraging and 8 lack of). Lastly, in the practice sub-category, most units were in LMS (N=38 units; 31 encouraging, four lack of, and three neutral). This was closely followed by empowerment (N=36; 22 encouraging, 10 lack of, and four neutral units). The third highest unit count was in accessibility (N=16 units; 12 encouraging, three lack of, and one neutral).

Instructional factors.

The final mid- and post-term interview question that asked participants to identify key factors that empowered them to integrate emergent technology for learning on demand focused upon instructional factors. After identifying key instructional factors, participants were asked why they thought these factors were empowering. Lastly, they were invited to list any instructional changes that would help learners continue to integrate emergent technologies now and in the future.

Eleven *instructional factor* sub-categories were generated from participant responses to these questions. These included: *activities, assignments, changes, content, course outcomes, experimentation, instructor, learners, no factors identified*, and *use of technology*. All of these sub-categories (as well as all terminal child code categories) contained the coding theme, *empowerment*, along with its sub-themes, *encouraging*, *lack of*, and *neutral*. The sub-category, changes, also contained: *access*, *activities, assignments, content, cost, course outcomes, course quality, instructor, learners, relevancy*, and *use of technology*. Although results from all units were considered in study findings, only coding themes with the highest number of unit frequencies were reported on in this section.

Mid-term.

A total of 308 mid-term units were sorted into the instructional factors category. Of these, 30 were further divided into activities, four into assessment, 62 into assignments, 38 into changes, 12 into content, ten into course outcomes, two into experimentation, 27 into instructor, 34 into learners, three into no factors identified, and 86 into use of technology. Use of technology had the highest frequency of units, containing 51 encouraging, 27 lack of, and eight neutral units. Assignments had the second highest number, with 51 encouraging, nine lack of, and two neutral units. In the third highest sub-category, changes, the greatest number of units was under instructor (N=10 units; six encouraging, two lack of, and two neutral). The second highest number of units in the changes sub-category was in use of technology (N=nine; six encouraging and three lack of units).

Post-term.

The 507 post-term instructional factor units were divided among sub-categories accordingly: 40 in activities, two in assessment, 70 in assignments, 82 in changes, 31 in content, 11 in course outcomes, nine in experimentation, 60 in instructor, 54 in learners, and 148 in use of technologies. In the sub-category containing most units, use of technology, there were 114 encouraging, 23 lack of, and 11 neutral units. Use of technology units (N= 25; 22 encouraging, two lack of, and one neutral) ranked first in the second highest sub-category, changes. This was followed by a 15-unit count (ten encouraging and four lack of units, and one neutral unit) under instructor in the changes sub-category. The third-ranking sub-category was assignments (N=70 units; 63 encouraging, three lack of, and five neutral), and the fourth was instructor (N=60; 50 encouraging, seven lack of, and three neutral units).

Summary.

Overall, there were 815 instructional factor units drawn from mid- and post-term interviews. These were divided into: 70 activities, six assessment, 132 assignments, 120 changes, 43 content, 21 course outcomes, 11 experimentation, 87 instructor, 88 learners, three no factors identified, and 234 use of technology sub-category units. Highest unit frequency counts indicated that most units were in the use of technology sub-category. Of these, 165 were encouraging, 50 were lack of, and five were neutral units. An example of one encouraging use of technology unit came from this quote, “MDDE [name of course] did a really great job of teaching us to evaluate different tools for technology that we can use to support the learning goals and how to create great interactivity in learning communities.” The sub-category, assignments, contained the second-highest count of units; 113 of these units were encouraging. Thirty-five of the encouraging units were further categorized into the theme, relevancy, 19 units were sorted into collaboration, and two into e-portfolio. The remaining assignment units were divided between lack of (N=12 units) and neutral (N=seven). The third ranking number of units was in the sub-category, changes (N=120 units). The highest count of units in this sub-category was in use of technology (N=34 units; 28 encouraging, five lack of, and one neutral). The second highest count was in instructor (N=25 units; 16 encouraging, six lack of, and three neutral.) Fourth- and fifth-highest instructional factor unit numbers were in the learners (N=88 units; 62 encouraging, 21 lack of, and five neutral) and instructors (N=87; 71 encouraging, 11 lack of, and five neutral) sub-categories.

Responsible for learning.

During mid- and post-term interviews, participants were also asked who they thought should hold the greatest responsibility for teaching them how to integrate emergent technologies now and in the foreseeable future, and why they thought this. The unit sorting process for this category resulted in the generation of: *employer*, *faculty*, *government*, *institution*, *instructor*, *other learners*, *self*, and *shared responsibility* sub-categories. Self was further divided into *empowerment* (with *encouraging* sub-themes of *currency, self-motivation*, and *teaching oneself*), and *responsible for others*. The encouraging theme within the shared responsibility sub-category was also sub-divided to accommodate sub-themes of *colleagues, employer, institution, instructor, other learners*, and *social media*. As per the established coding framework pattern, all sub-categories and terminal child categories included *empowerment,* along with its sub-sections, *encouraging, lack of*, and *neutral*. Mid-term results are presented first.

Mid-term.

The 164 responsible for learning mid-term units were amassed from eight employer, three faculty, 20 institution, 17 instructor, seven other learners, 76 self, and 33 shared responsibility sub-category units. Within the highest unit frequency sub-category, self, the greatest number of units were in empowerment (N=69 units; 62 encouraging, six lack of, and one neutral). Among the 69 encouraging units, four were further sorted into currency, 28 were sorted into self-motivation, and 19 more were sorted into teaching oneself. An illustration of an encouraging teaching oneself unit is the following respondent quote, “I am taking the course for a reason, so the primary responsibility probably falls on me, and especially if there is some kind of obstacle in whatever it is: the curriculum, the teacher, or something like that.” Shared responsibility had the second greatest number of units (N=33 units; 31 encouraging and two lack of). Institution had the third largest quantity of units (N=20; 16 encouraging and four lack of).

Post-term.

One of the 145 post-term responsible for learning units was sorted into the employer sub-category. The remaining responsible for learning units were sorted into government (N=two units), institution (N=five units), instructor (N=21), other learners (N=12), self (N=79), and shared responsibility (N=25). In the highest unit count sub-category, self, 65 units belonged to the encouraging section; some of these units were further sorted into self-motivation (N=27), teaching oneself (N=25 units), relevancy

(N=eight), and currency (N=four). The second highest count of units were in the shared responsibility sub-category (N=23 encouraging and two neutral units).

Summary.

In all, 309 mid- and post-term units were catalogued in the responsible for learning category. These were divided into eight sub-categories: employer (N=nine units), faculty (N=three), government (N=two), institution (N=25), instructor (N=38), other learners (N=19), self (N=155), and shared responsibility (N=58). One hundred and thirty eight empowerment units were accounted for within the highest unit frequency sub-category, self. Of these, most were encouraging units (including 55 self-motivation, 44 teaching oneself, eight currency, and eight relevancy units). The remaining 11 empowerment units were divided into nine lack of and two neutral units. The second most frequent number of units came from the shared responsibility sub-category (N=58 units). Of these, 54 were encouraging (with 50 of these units further separated into 14 other learners, 12 instructor, 11 employer, eight colleagues, four institution, and one social media units). The remaining four of the 58 units were equally divided into lack of and neutral themes. The third largest number of units came from the instructor sub-category (N=38 units; 30 encouraging, three lack of, and five neutral). The fourth greatest quantity of units was found in the institution sub-category (N= 25; 20 encouraging and five lack of). Finally, the fifth greatest quantity of units came from the sub-category, other learners (N=19; 11 encouraging, five lack of, and three neutral).

Change in thinking.

One question exclusive to the post-term interview script asked respondents if their ideas about the key factors that most empowered them or other learners to integrate emergent technologies for learning on demand had changed as a result of having completed the course. They were then given opportunity to elaborate on why their thinking had or had not changed.

Respondent units under the main *change in thinking* category were sub-divided into six secondary categories: *all, curricular, environmental, government, institutional*, and *instructional* factors. Each of these was further separated into *yes* and *no* (indicating whether respondent thinking had changed in regards to the specified factor or not), and *empowerment*. Finally, empowerment was broken down into *encouraging, lack of*, and *neutral* categories.

A total of 78 change in thinking units were accounted for. Twelve were sorted into the all factors group, which was further sub-divided into units of eight no, three yes, and one encouraging. Of the 14 curricular factors, there was one yes, two no, two lack of, and nine encouraging units. The four environmental factors yielded one yes and three encouraging units. The 48 change in thinking instructional factor included 33 encouraging, four lack of, six neutral, two no, and three yes units. One quote that was coded to the encouraging instructional change in thinking category was, "Instead I started to realize the wider pedagogical reasons for why to use mobile devices in my teaching, which is to make more connections between students' environments; the location that they are in, and the environment that they are in, and to make connections between that and the learning that they are doing."

Interviewees were given an opportunity to add any other comments about integrating emergent technologies for learning on demand near the end of the mid- and post-term interviews. These comments were then coded as units into the existing coding framework.

Study comments.

When asked if they would like to add any questions or comments about the interview or the dissertation study, most respondents either chose not to respond, or asked if they could discuss the study off of the record. Typical off-of-the-record discussions included such topics as: inquiries about the doctoral program, how to conduct a research project (such as how to apply for REB approval, develop online questionnaires, and conduct interviews), suggesting or requesting further literature resources, applying for research grants, and the like. On rare occasions, when the researcher felt that the conversation directly pertained to the study in some manner, permission was gained to either turn the recorder back on to add these comments on the record, or to add notes to the researcher's journal for future reflection and possible inclusion in the dissertation. Comments added on the record were coded by unit to the existing coding framework in the same manner as other interview comments were.

The main *study* category held units that did not relate to learner empowerment. The single sub-category was *empowerment*, which was further divided into *encouraging, lack of*, and *neutral* units. There were 37 mid-term study units in all. Nineteen of these were sorted into the empowerment sub-category; 11 were encouraging, four were lack of, and four were neutral units. Post-term results showed a total of 22 study comment units. Of these, five were encouraging and six were neutral units.

There were 59 mid- and post-term study comment units in all. Thirty of these were located in the sub-category, empowerment. Within this sub-category, units were divided into 16 encouraging, four lack of, and ten neutral units. One encouraging comment about the study was, "So I think it is wonderful that a project like this is looking at how universities and educational institutions could hopefully move towards using emerging technologies and also ways that they could perhaps improve their learning environments so that students will not be turning away from university education to pursue an education that is more practical to finding jobs."

Uncoded.

During the coding process a number of units were encountered from the interviews that did not appear to hold relevance to study purposes (for instance, a unit containing a participant's request for the reiteration of a question, participant phrases that ended before a thought was expressed, expressive units, such as "[Laughs]," or units that were too vague to code with confidence.) One goal in the coding process was to ensure that no unit remained unrecorded or unaccounted for. To accommodate this goal, the category, *uncoded*, was created to hold units that did not appear to fit elsewhere in the coding framework. When all units had been coded, units in the uncoded category were reviewed again to ensure that they did not belong elsewhere in the framework. The remaining units stayed in uncoded.

A total of 308 mid- and post-term uncoded units were accounted for. One hundred and forty-six units were catalogued from mid-term interviews, and 162 from post-term interviews.

X-Concept of technology.

All units in the category, *X-Concept of technology*, were also coded to other categories. The purpose of this category was to collect a few samples of interviewee comments that illustrated their conception of the term, technology, and how these conceptions reflected or did not align with the proffered dissertation definition. To this end, two sub-categories were created: *broader term* and *utilitarian*.

Eighteen mid- and post-term X-Concept of technology units were collected; 12 from mid-term and six from post-term interviews. Of these, six units were included in the sub-category, broader term (N=three mid- and three post-term units), and 12 in the sub-category, utilitarian (N=nine mid- and three post-term units).

Summary of qualitative results.

This summary of qualitative coding results opens with a comparative review of mid-term data on emergent technology integration empowerment units and then all units identified during the coding process from the following categories: a personal technology goal (post-term only), change in thinking (post-term only), curriculum, environment, government, institution, instruction, and responsible for learning. A similar review of post-term data is conducted next. Lastly, a synthesis of mid- and post-term results is offered. All data results are reported in categories from highest to lowest percent of total coded units. (Percentages are rounded to nearest tenth of a percent.)

Mid-term.

Comparative technology integration empowerment factors data results from mid-term interviews are presented before cumulative mid-term results on all coded units are.

Empowerment: All identified factors.

Mid-term emergent technology integration empowerment unit results for institutional, curricular, instructional, and contextual factor categories are included in this section.

There were 1228 mid-term emergent technology integration empowerment units in all (Figure 14). The greatest total number of mid-term empowerment units was in the instruction category (N=24.6%; consisting of 18.3% encouraging, 4.5% lack of, and 1.8% neutral units). The environmental factors category had the second largest number of units (N=23.5%; 17.3% encouraging, 3.8% lack of, and 2.4% neutral units). Curriculum contained the third most units (N=19.9%; 13.7% encouraging, 4.7% lack of, and 1.5% neutral). The responsible for learning category held the fourth greatest quantity of units (N=13.8%; 12.6% encouraging, 0.9% lack of, and 0.3% neutral). Institutional factors were next (N=13.6%; 8.9% encouraging, 3.3% lack of, and 1.4% neutral). The government factors category held the least number of empowerment units (N=4.6%; 3.4% encouraging, 0.9% lack of, and 0.3% neutral).

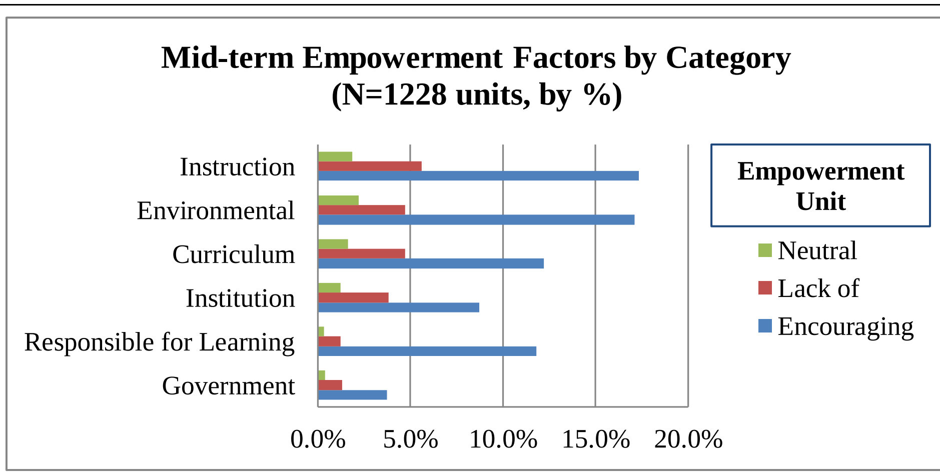


Figure 14. Mid-term emergent technology integration empowerment category factors, expressed in percent of all units (N=1228 units; one unit equals one sentence.)

All coded units.

In all, 1579 mid-term units were coded (Figure 15). The instructional factors category contained the largest total number of mid-term units (19.1% of all units). The environmental factors category contained the second highest frequency of units (18.9%) and curricular factors had the third (15.2%). Next were institutional factors (N=10.7%). This was followed by responsible for learning (N=10.6%). The personal technology goal category contained 9.7% of all units. The uncoded category was next (N=9.6%). Government factors were third from last (N=3.6%). Study comments yielded 2.2% of all coded units. Finally, the X-Concept of technology category contained 0.6% of all units.

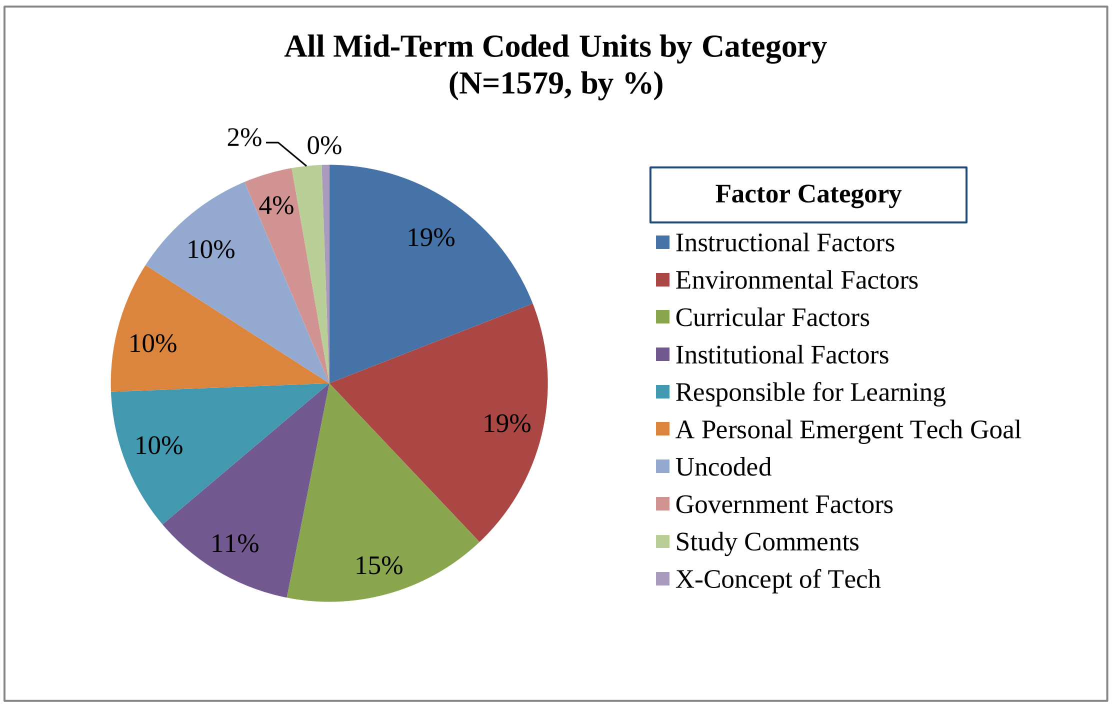


Figure 15. Percent of all mid-term coded units (N=1579 units; one unit equals one sentence.)

Post-term.

Post-term comparative technology integration empowerment factors results are reported upon before cumulative post-term results on all coded units are presented. Two categories were exclusive to the post-term: a personal technology goal and change in thinking. (The mid-term personal technology goal question did not evoke empowerment statement responses, while the post-term version of this question did. Secondly, the change in thinking question was included only in the post-term interview.) The discussion on empowerment results begins with a review of all identified empowerment factors.

Empowerment: All identified factors.

There were 1325 empowerment units included in the eight post-term categories (Figure 16). Most units were found in the instructional factors category (39.1% of all eight post-term category units, consisting of 31.9% encouraging, 5.1% lack of, and 2.1% neutral units). Environmental factor unit numbers were second highest among the nine categories (N=22.5%; 15.6% encouraging, 4.9% lack of, and 2% neutral).

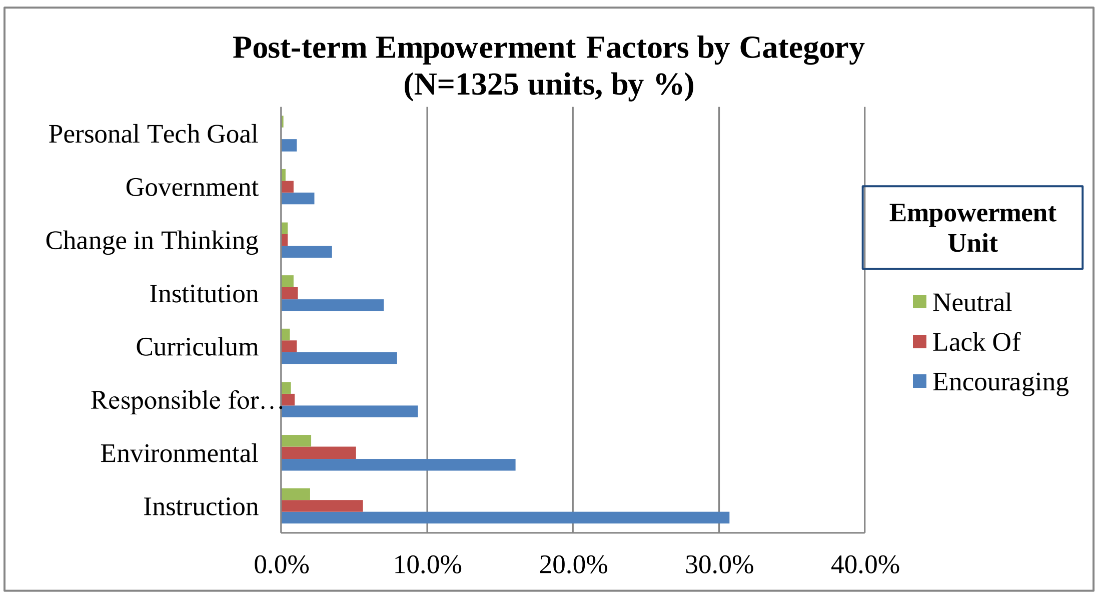


Figure 16. Post-term emergent technology integration empowerment category factors, expressed in percent of all units (N=1325 units; one unit equals one sentence.)

The responsible for learning category had the third greatest number of post-term units (N=11.1%; 9.75 encouraging, 0.8% lack of, and 0.6% neutral). The institutional category came in fourth (N=9.3%; 7.4% encouraging, 1.1% lack of, and 0.9% neutral), while the curricular was fifth (N=9%; 7.4% encouraging, 1.1% lack of, and 0.5% neutral). The change in thinking category had the sixth greatest number of units (N=4.6%; 3.8% encouraging, 0.4% lack of, and 0.4% neutral). The government factors category contained the seventh greatest number of units (N=3.2%; 2.1% empowering, 0.8% lack of, and 0.3% neutral). The final category, study comments, contained the least number of post-term empowerment units (N=1.4%; 1.2% encouraging and 0.2% neutral).

All coded units.

There were 1616 units coded to all categories from the post-term interviews (Figure 17). The most prevalent number of units was found in the instructional factors category (N=32.4% of all post-term units). The second greatest quantity of units was in the environmental factors category (N=19.3%). Uncoded was the third highest category (N=9.6%). Responsible for learning was the fourth category (N=9.1%). The institutional factors category contained the fifth highest number of units (N=7.6%). The curricular category was close behind (N=7.5%). Seventh from the top was a personal technology integration goal N=5.4%). Change in thinking came next (N=5.1%). The government factors category was third from the bottom in the frequency of unit numbers list (N=2.6%). Study comments were second last (N=1.3%), and X-Concept of technology was last (N=0.3%).

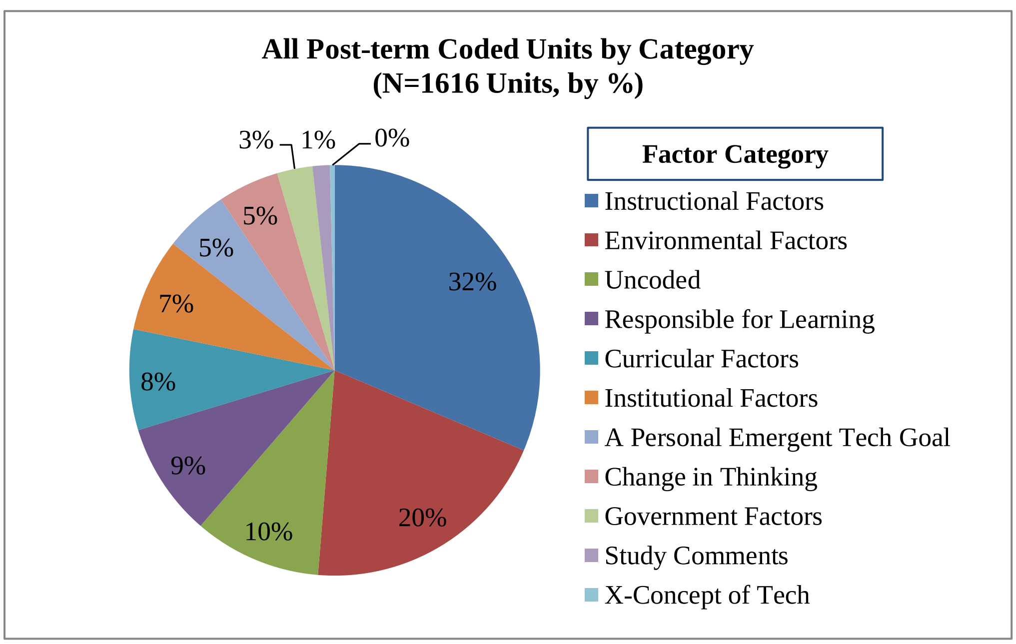


Figure 17. Percent of all post-term coded units (N=1616 units; one unit equals one sentence.)

Mid- and post-term.

This sub-section includes cumulative mid- and post-term results for both courses from all interview data. Emergent technology integration empowerment factors are presented before final synthesis of all coded results is given.

Empowerment: All identified factors.

There were 2,553 mid- and post-term empowerment units recorded from eight coding categories (Figure 18). The most significant portion of these units came from the instruction category (N=31.8% of all relevant units; 24.3% of these were encouraging, 5.6% lack of, and 1.9% neutral units). Environmental factors contained the second greatest number of empowerment units (N=23.6%; 16.6% encouraging, 4.9% lack of, and 2.1% neutral). The third largest quantity of units were in the curricular factors category (N=13.9%; 10% encouraging, 2.8% lack of, and 1.1% neutral).

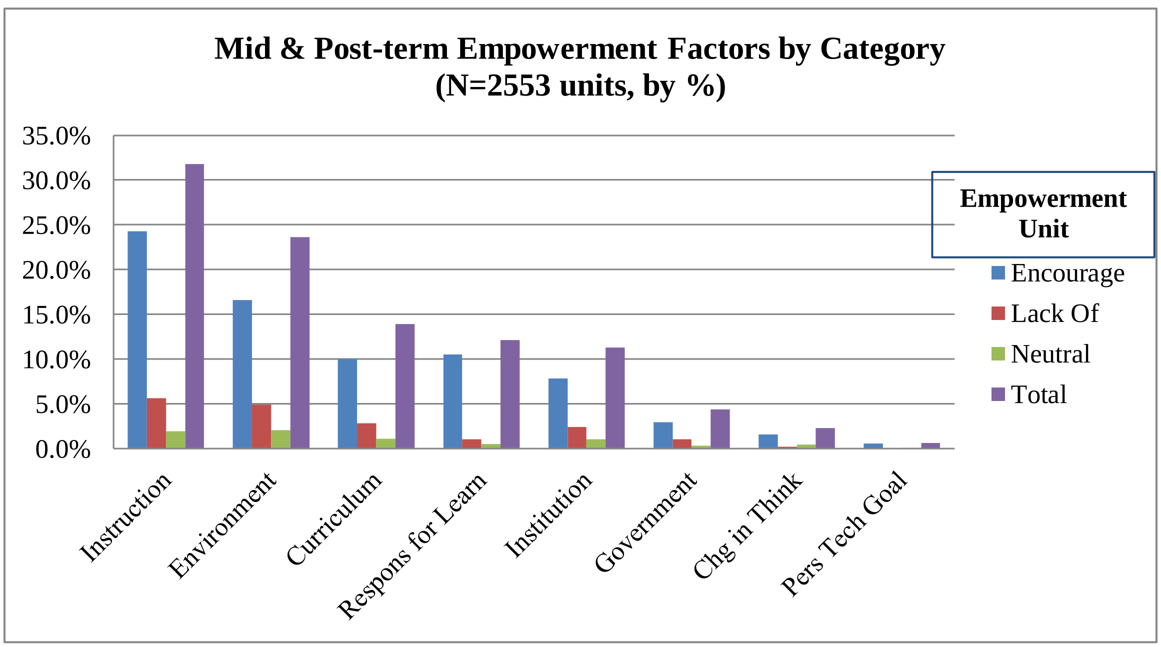


Figure 18. Mid- and post-term emergent technology integration empowerment category factors, expressed in percent of all units (N=2553 units; one unit equals one sentence.)

The responsible for learning category contained the fourth largest number of these mid- and post-term units (N=12.1%; 10.5% encouraging, 1.1% lack of, and 0.4% neutral). The fifth highest-ranking category was institutional factors (N=11.3%; 7.8%

encouraging, 2.4% lack of, and 1% neutral). Government factors ranked sixth in unit numbers (N=4.4%; 3% encouraging, 1.1% lack of, and 0.4% neutral). The second least number of units was in the post-term change of thinking category (N=2.3%; 1.6% encouraging, 0.2% lack of, and 0.4% neutral). The final category, which contained only post-term results, was a personal technology integration goal (N=0.6%; 0.5% encouraging and 0.1% neutral units).

Empowerment themes across categories.

Some common empowerment themes were identified across a number of mid- and post-term categories. These themes were, in order of greatest to least unit numbers, *use of technology*, *relevancy*, *accessibility*, and *currency and Pro-D* (Figure 19). The total number of these thematic units was 736, constituting 35.8% of all mid- and post term empowerment units.

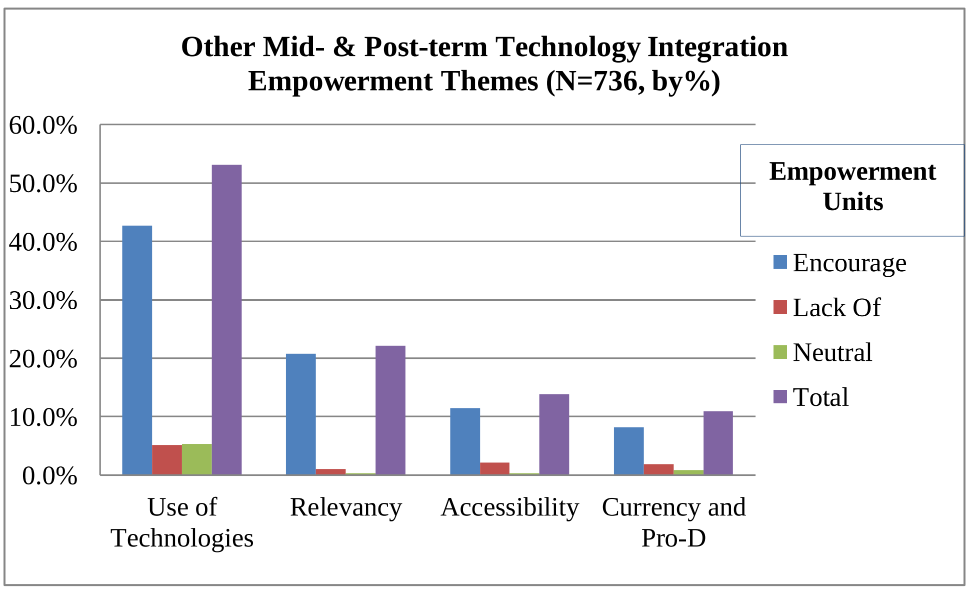


Figure 19. Other mid- and post-term emergent technology integration empowerment themes, expressed in percent of all units (N=736 units; one unit equals one sentence.)

The theme, use of technologies, contained 53.1% of these other mid- and post-term thematic units, broken down into 42.7% encouraging, 5.2% lack of, and 5.3% neutral units. Relevancy was the second most prevalent theme (N=22.1% of cross-category theme units; 20.8% encouraging, 1.1% lack of, and 0.3% neutral units). Accessibility was the third most noted theme (N=13.9%; 11.4% encouraging, 2.2% lack of, and 0.3% neutral). Finally, currency and Pro-D contained 10.9% of the identified thematic units (N=10.9%; 8.2% encouraging, 1.9% lack of, and 0.8% neutral).

The presentation of these themes concludes the mid- and post-term emergent technology integration empowerment summary. The next qualitative summary includes results for all coded units.

All coded units.

There were a total of 3,195 mid- and post-term interview units sorted into nine code categories (Figure 20). The category containing the highest number of all units was instructional factors (N=25.4%; consisting of 9.8% mid- and 15.7% post-term units). The environmental factors category had 19.8% of all units (9.8% mid- and 10% post-term units). The third highest frequency of units was in the curricular factors category (N=11.2%; 7.3% mid- and 4% post-term units). Responsible for learning included the fourth greatest number of units (N=9.7%; 5.2% mid- and 4.5% post-term units).

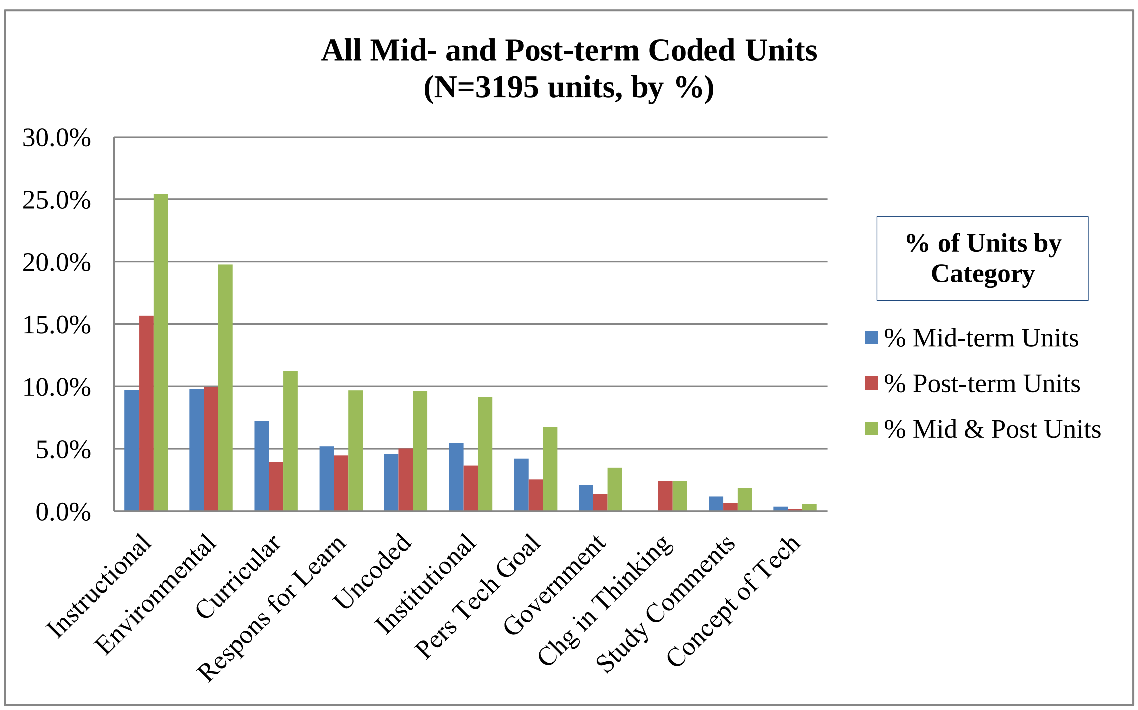


Figure 20. Percent of all mid- and post-term coded units (N=3195 units; one unit equals one sentence.)

The uncoded category held the fifth number of all mid- and post-term units (N=9.6%; 4.6% mid- and 5% post-term units). Institutional factors ranked sixth (N=9.2%; 5.5% mid-; 3.7% post-term units). A personal technology goal followed, with 6.7% of all units (4.2% mid- and 2.5% post-term units). Three and a half percent of all units were sorted into the government factors category (derived from 2.1% mid- and 1.4% post-term units). Change of thinking ranked ninth highest, containing 2.4% of all units, which were collected from only post-term interviews. Study comments included 1.9% of all units (1.2% mid- and 0.7% post-term units). The least number of units were in the X-Concept of technology category (N=0.6%; 0.4% mid- and 0.2% post-term units).

Merged Quantitative and Qualitative Results

Aggregation of qualitative and quantitative data results enabled the researcher to answer the overarching question, "What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?" The ability to identify what paradigm respondents appeared to prefer throughout the term also facilitated responses for Questions 2 and 3 of the study.

This section begins with the results from the initial integration of quantitative and qualitative data that generated individual respondent paradigm profiles. Next, it moves on to technology integration before discussing scaffolding and learning curve results. The section concludes with a summary of cumulative findings on paradigms and technology integration, as well as scaffolding and learning curve results throughout the term.

Paradigms.

Pre-test questionnaire and mid-term interview results were combined to create early term paradigm profiles for individual participants. Post-term questionnaire and post-term interviews were blended in the same manner to generate individual post-term profiles.

Individual quantitative participant results from the autonomy, purpose, mastery, and innovation, as well as reflection, critical reflection, and reflexivity were combined with qualitative personal technology integration goal, responsible for learning, and change in thinking (post-term only) results to produce early- and post-term paradigm profiles. These profiles were derived from a rubric that contained a score for each area identified above. Scores were calculated out of a possible number of five where, for instance, zero indicated no preference and five indicated total preference for a pedagogical learning environment.

While questionnaire results had been designed to be easily translated into scores using the pedagogical (P), pedagogical/andragogical (PA), andragogical (A), andragogical/heutagogical (AH), and heutagogical (H) scoring rubric, greater interpretation was needed to determine such scores from the qualitative data. Therefore, both coders were employed to separately determine qualitative scores before agreeing upon final qualitative scores together. (Initial inter-coder agreement was 93.3%, with all disagreements being between two categories located beside each other in the rubric.) Together, the coders then reviewed all quantitative and qualitative data compiled for each participant to confirm accuracy and consistency of paradigm scores.

Resulting early- and post-term profiles for each participant are presented by coded respondent name. Early-term results are given before post-term results are.

Early-term results indicated that participant A1 preferred a pedagogical learning environment [P Score (S) = 2.7 out of 5; Figure 21]. This preference was strengthened by the end of the term (S=3.6). While A2 indicated preference for a P environment early in the term (S=2.1), this preference had become evenly split between A and H environments (S=1.7 each), thus suggesting an AH preference by the end of the term. Participant A3 was slightly more P (S=1.9) than A (S=1.8) early in the term, indicating a PA profile; by the end of the term A3 was A (S=2.2). Participant A4 maintained an H profile throughout the term (S=2.5 early term; 1.9 post-term). A6 had an H early-term profile (S=2.2) and an A profile when the term was over (S=2.4). Next, A7 had an early-term P profile (S=2.0), and an AH profile by the end of the term (A score=1.8; H score=1.7). A8 indicated a preference for the A learning environment early in the term (Score=2.3). By the end of the term, A8 most liked an H environment (S=2.8). Early in the term, A9 had a PA profile (P Score=1.8; A Score=1.7); by the end of the term, A9 had an H profile. A10 was H at the beginning of the term, but was AH by the end of the term (A Score=2.0; H Score=2.0). A11 had an H profile throughout the term (Early-term S=2.2; post-term S=2.3). Lastly, A12 maintained an A profile from the beginning of the term (S=2.4) to the end of the term (S=3.0). Figure 21 offers a synthesis of these results by preferred learning environment.

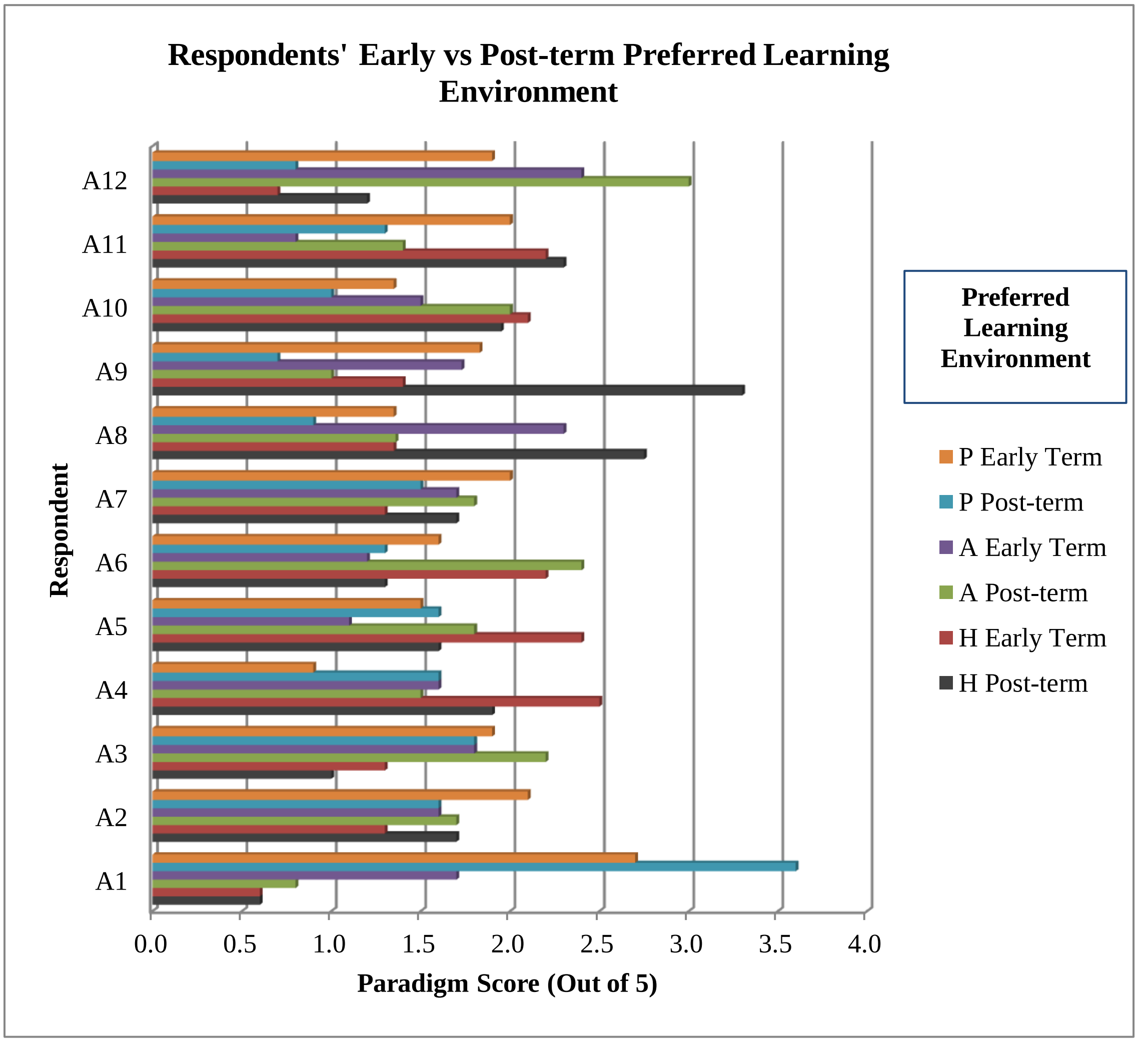


Figure 21. Respondents' early versus post-term preferred learning environment (using a scoring system from 0 to 5; P=pedagogical, A=andragogical, and H=heutagogical learning environment).

Technology integration.

In this section on merged results, emergent technology integration mastery levels and greatest emergent technology integration factor are reported upon according to individual participants' paradigm profiles (that is, participants' preferred behavioural/P environment; shifting/A environment, or perceptual/H environment).

Technology integration levels by paradigm.

Participants' quantitative results from the mastery section of the pre- and post-term questionnaires were sorted according to their individual paradigm profiles to determine if there was a difference in technology integration ratings between learners with various learning paradigm preferences. (Technology integration ratings employed a Likert scale, where 0=no response, 1=little knowledge; 3=practice, and 5=capacity.) Next, the means were calculated for early and post-term to provide an overall picture of respondents' perceived level of emergent technology integration mastery in relation to their preferred learning paradigm over time.

According to the results, all participants shared very similar early-term technology integration mastery ratings (P and A=3.3 mastery rating out of 5; H=3.2 out of 5). By the end of the term, the highest technology integration rating was among H participants (H mean=4.2), the mid-level rating was among A participants (A mean=3.4), and the lowest was among P participants (P mean=2.8). When early-term and post-term results were merged, the average H rating was highest (mean=3.7), A ratings were mid-level (mean=3.4), and P ratings were lowest (mean=3.1).

Technology integration factors: Constant vs shifting paradigms

This section presents mid- and post-term technology integration empowerment factors containing the five highest numbers of units for constant and shifting paradigm groups (Figure 22). Results are reported from the highest to the lowest percent of units among these five factors.

In the P grouping, government/changes/lack of and instruction/use of technology/lack of had the highest percent of P empowerment units (25.8% each). This was followed by environment/work/encouraging (22.6% of P empowerment units), and then environment/work/lack of and institute/practice/curriculum/lack of (12.9% each).

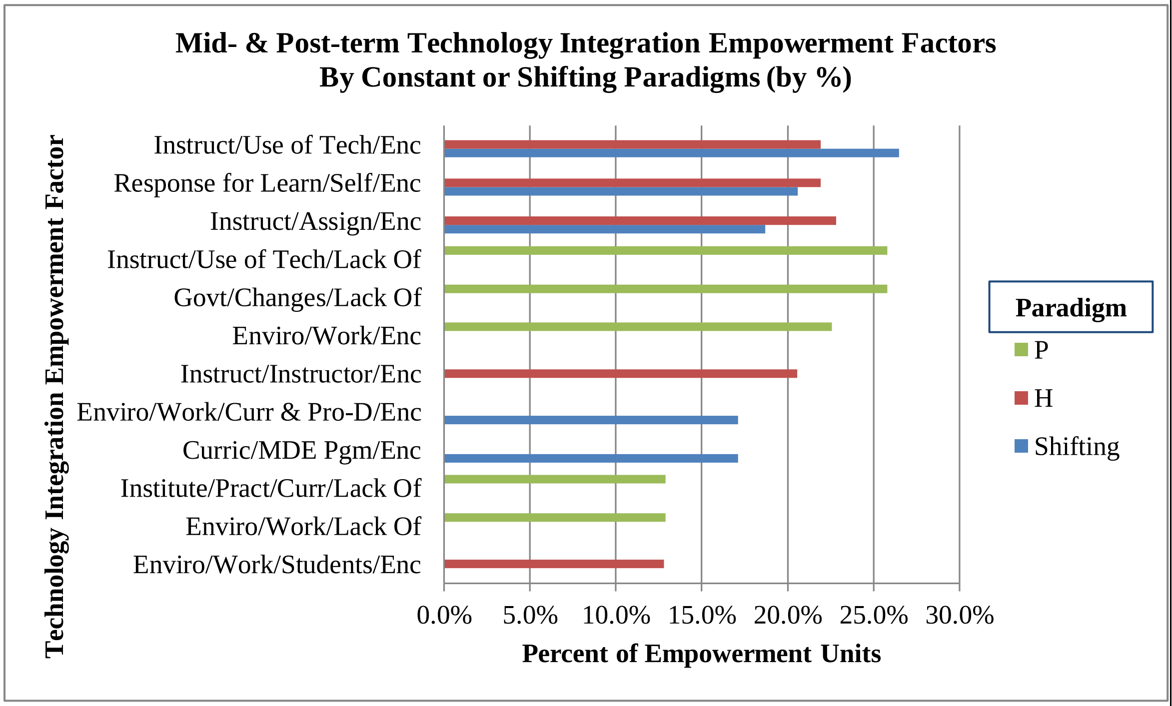


Figure 22. Mid- and post-term greatest technology integration empowerment factors by constant or shifting paradigms (P=behavioural paradigm/pedagogical environment, H=perceptual paradigm/heutagogical environment, and Shifting= shifting paradigm/changing learning environments or andragogical learning environment; expressed as % of total units for each paradigm).

In the H group, instruction/assignments/encouraging had the highest percent of H empowerment units (22.8%). The second highest percent of units were shared by instruction/use of technology/ encouraging and responsible for learning/self/encouraging sub-categories (21.9% each). Instruction/ instructor/encouraging had 20.5% of H units, and environment/ work/students/encouraging had 12.8% of these units. The largest percent of empowerment units in the shifting paradigms group was in instruction/use of technology/encouraging (26.5% of shifting paradigms empowerment units). The next highest percentage of shifting paradigm units was in the sub-category, responsible for learning/self/ encouraging (20.6%). The remaining percentages of these units, in descending order, were in instruction/assignments/encouraging (18.7%), curriculum/ change/program/ encouraging (17.1%), and instruction/instructor/encouraging (also 17.1%) sub-categories.

Scaffolding and learning curve.

Participants were asked to rate their level of agreement to two statements on the post-test questionnaire, using a Likert scale from 1=strongly disagree to 5=strongly agree (with 0=no response). The first statement said that the respondent needed more technology integration instructional support and scaffolding than others students did in the course. The second statement said that the respondent had experienced a significant emergent technology integration learning curve during the term. The individual results from these statement ratings were subsequently divided into four identified preferred post-term learning environments, and means for each were then calculated.

The P and A scaffolding mean was 1 (strongly disagree). The AH scaffolding mean was 3 (neutral), and the H mean was 1.8 (disagree). The P learning curve was also 1 (strongly disagree). The A learning curve was 1.3 (strongly disagree). The AH learning curve was 4 (agree) and the H was 2.3 (disagree).

The scaffolding and learning curve results were then re-sorted into groups representing respondents who indicated a consistent preference for a P or H learning environment throughout the term, or whose learning environment preferences appeared to shift during the term. Scaffolding results from this re-grouping indicated that P and H groups strongly disagreed (mean=1) with the statement that they required more scaffolding than others in their course, while the shifting paradigms group disagreed (mean=2.3). Secondly, the P group strongly disagreed (mean=1) that they experienced a greater learning curve than other learners during the term, the H groups disagreed (mean=2), and the shifting paradigms group expressed neutrality (mean=2.8) towards this statement.

Other perceptual results.

During the triangulation of data process some noteworthy patterns emerged. One related to the disparity between perceived changes in thinking that some participants reported during post-term interviews, and what other cumulative quantitative and qualitative data results indicated.

Participants were asked if they had experienced any change in thinking about the key factors that most empowered other learners or them to integrate emergent technologies for learning on demand after completing the course during post-term interviews. Out of the twelve participants in the study, five said yes, six said no, and one did not respond. Yet quantitative and qualitative data results indicated that six respondents had experienced a significant change in thinking, four had a moderate change in thinking, and two had experienced a slight change in thinking over the term.

Summary.

The final summary of merged quantitative and qualitative data results is divided into three main sub-sections: paradigms, technology integration, and scaffolding and learning curve.

Paradigms.

Synthesis of individual participant preferred learning paradigm profile results into P (behavioural paradigm/pedagogical learning environment), H (perceptual paradigm/ heutagogical learning environment), and Shifting paradigm (shifting paradigm/shifting and andragogical learning environments) groups indicated that early in the term there was a nearly equal balance between paradigm preferences among respondents, although P was slightly more preferred (P=35.1%, H=32.2%, and Shifting=32.7; Figure 23). By the end of the term, paradigm preferences had become more diverse, with H dominating (H=37.0%), shifting following close behind (Shifting=35.0%), and P being least preferred (P=28.0%).

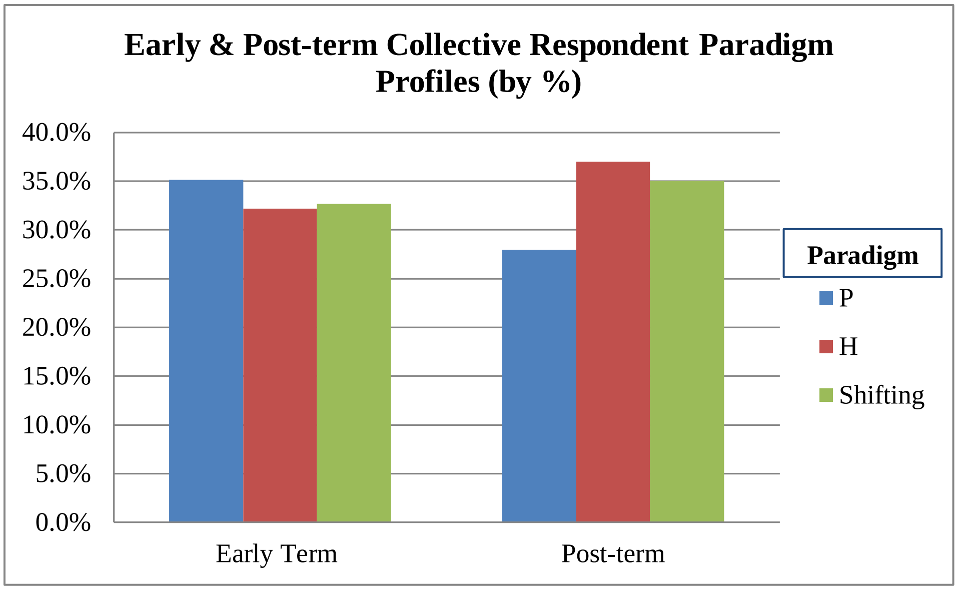


Figure 23. Early- and post-term collective respondent paradigm profiles (P=behavioural paradigm/ pedagogical environment, H=perceptual paradigm/heutagogical environment, and Shifting= shifting paradigm/changing learning environments or andragogical learning environment; expressed as % of total units for each paradigm)

The quantitative and qualitative results summary now moves on to technology integration.

Technology integration.

The quantitative and qualitative technology integration summary considers the individual empowerment factors containing the five highest number of mid- and post term units by preferred paradigm.

Mid- and post-term technology integration empowerment factors were sorted by participants' preferred learning paradigm. The five individual factors containing the most empowerment units for each paradigm were then selected to be reported upon.

The highest percentage of P empowerment units was associated with the curricular/changes/program/encouraging factor (27.2% of the top five P empowerment units; Figure 24). Instructional/use of technology/lack had the second highest percentage of these units (21.3%). Responsible for learning/self/encouraging had the third highest percentage (18.8%). Instructional/use of technology/encouraging and curricular/program/ encouraging factors were last (16.3% each). The PA group results, reported in descending order of unit percentage, were: institution/practice/LMS/ encouraging (28.3% of the top five PA factor units), responsible for learning/self/encouraging (23.9%), instructional/ assignment/encouraging (19.6%), instructional/learners/ encouraging (15.2%), and instructional/use of technology/encouraging (13%).

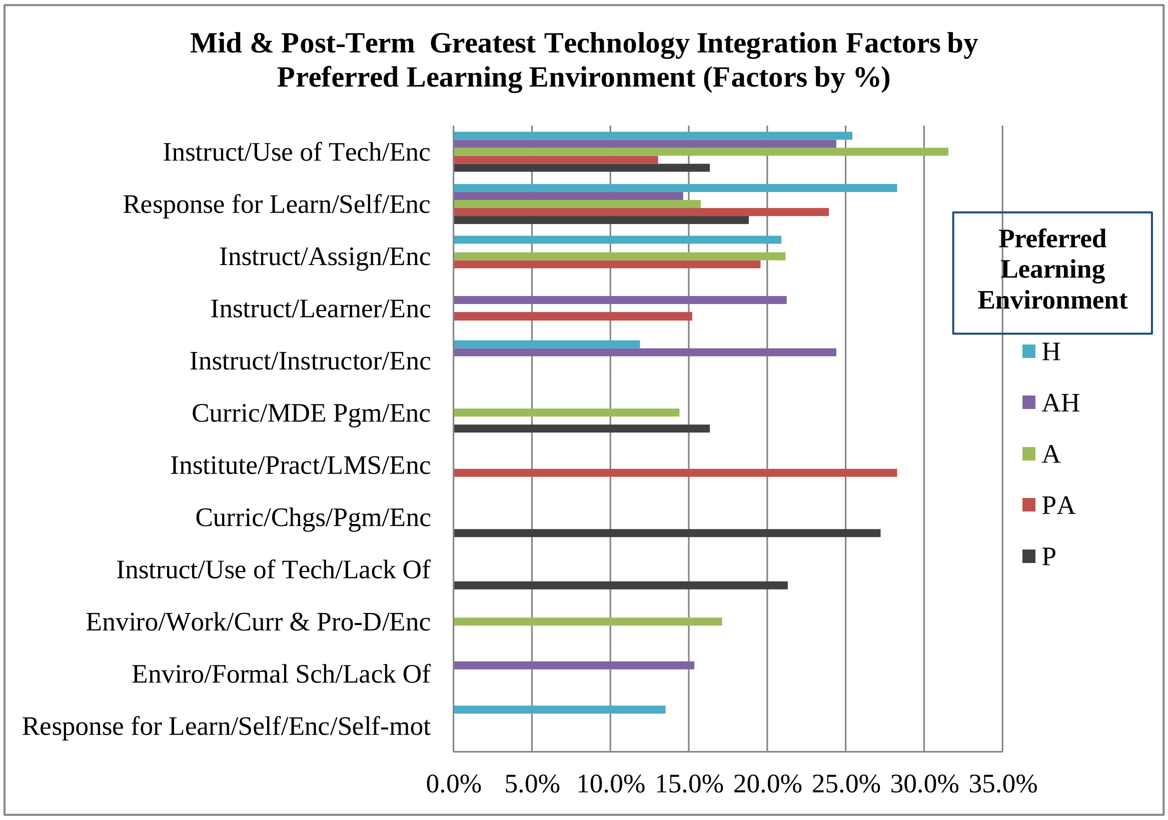


Figure 24. Mid- and post-term greatest technology integration empowerment factors by preferred learning environment (by percent of units; P=pedagogical, PA=pedagogical/andragogical, A=andragogical, AH=andragogical/heutagogical, and H=heutagogical).

Instructional/use of technology/ encouraging had the highest percent of units in the top five A factors (31.5%). This was followed by instructional/assignments/encouraging (21.2% of top five A factor units), environment/work/currency & Pro-D (17.1%), responsible for learning/self/encouraging (15.8%), and curricular/program/encouraging (1.4%). Instruction/instructor/encouraging and instructional/use of technology/encouraging had the highest percentage of units among the top five AH empowerment factors (24.4% each). This was followed by instruction/learners/encouraging (21.2% of top five AH factor units), environment/formal school/lack of (15.4%), and responsible for learning/self/encouraging (14.6%). Responsible for learning/self/encouraging had the greatest percentage of empowerment units in the H group's list of top five factors (28.3%). The second highest percent was instructional/use of technology/encouraging (25.4% of the H top five factor units). This was followed by instructional/assignments/encouraging (20.9%), responsible for self/encouraging/self/self-motivation (13.5%), and instructional/instructor/encouraging (13.5%).

Scaffolding and learning curve.

The final quantitative and qualitative summary is on the post-term results that compared participants' perceived scaffolding needs and learning curve ratings to their paradigmatic profiles. Results indicated that participants in the AH group required the most scaffolding and experienced the greatest learning curve. Those identified with the H group required minimal scaffolding and reported a slight learning curve; those in the P and H groups strong disagreed that they needed more support than classmates or experienced a significant learning curve.

Summary

The chapter summary is divided into four main sub-sections. A summation of quantitative results is presented first. This is followed by the qualitative results summary. The third subsection summarizes the results from the synthesis of quantitative and qualitative data. Within each of these subsections, a typical respondent profile is drawn, based upon common patterns and trends found in data results. The final subsection provides the overall conclusion about the results presented in this chapter.

Quantitative results.

Twelve respondents completed quantitative pre- and post-term questionnaires that focused primarily upon participants' perceptions of their motivational drives and reflective thinking processes, as identified in the omni-tech taxonomy. The pre-term questionnaire also collected demographic information, while the post-term questionnaire included questions on participants' perceived emergent technology integration scaffolding and learning curve experienced during the term. Lastly, the pre-term questionnaire asked participants if they were setting a personal emergent technology integration goal for the term; the post-term questionnaire asked if they had worked on this goal. Alone, the results from the 24 pre- and post-term questionnaires were statistically insignificant. Nonetheless, these results triangulated, enriched, and extended qualitative data results, as well as tested the operationalization of the omni-tech taxonomy conceptual variables. Keeping the small number of respondents in mind, a tentative respondent profile is drawn, based upon cumulative questionnaire results.

Typical respondent profile.

The typical respondent who completed the pre- and post-test questionnaire represented over one-third of the two classes involved in the study (N=35.3% of Course A and B students). This respondent was most likely to be a female between the ages of 50 and 54 who lived in a large urban setting (population over 500,000). She had most likely completed over half of the courses in the MEd DE program (N=5 or 6 courses).

Three aspects of autonomy were explored in the study: course decisions, learning about new technologies, and learning situations. The typical respondent felt that most decisions about the course were currently made by the instructor; fewest decisions were made by the government. Although she felt that most of these decisions should be made by the student and instructor in the future, she was content to have the government continue to make the least decisions. She learned best about emergent technologies from trial and error. The worst resources for this type of learning from her perspective were younger children, family, friends, or the instructor. Finally, she said that she most preferred to learn alone when asked what size of group she most liked to learn about integrating emergent technologies in; her worst learning environments were MOOCs.

Data on the drive, purpose, was divided into: (1) setting and working on a personal technology integration goal, (2) scaffolding, (3) learning curve, and (4) emergent technology integration aims. The typical respondent had set a personal emergent technology integration goal at the beginning of the term, but confessed that she may not have worked on it during the term. She strongly disagreed that she needed more emergent technology integration scaffolding than classmates or had experienced a significant emergent technology integration learning curve during the term. Finally, she strongly agreed that learning how to integrate emergent technologies for economic reasons was important and agreed that learning how to integrate emergent technologies for social reasons was also important. However, she expressed neutrality over learning how to integrate emergent technologies for altruistic reasons.

Two areas were explored in the innate drive of mastery section: competency with emergent technologies and primary technology integration goal. The typical respondent indicated that she had obtained a capacity level of skill with LMS technologies when asked to rate her level of mastery with 16 different emergent technologies. She was least skilled with 3D printing technologies. The most important technology integration goal for her was to transfer knowledge to new situations; the least important goal was to be as competent as her peers.

The final innate drive explored was innovation. In this section, the typical respondent agreed that she liked to create new products or resources at work, but strongly disagreed that she liked to transform her own learning in home and informal settings.

The last quantitative section of the questionnaires asked respondents to indicate their level of agreement with emergent technology integration reflection, critical reflection, and reflexive statements. The typical respondent strongly agreed that her reflective thoughts usually focused upon the effectiveness of a new technology or how it impacted learner access to knowledge. She disagreed that she typically thought about how the new technology could transform the way that she learned, or how it might impact social structures.

Qualitative results.

The twelve study respondents also completed mid- and post-term interviews. The pre- and post-term interview scripts were nearly identical. The pre-term script varied in that it asked respondents who had set a personal emergent technology integration goal for the term if the first assignment would help them to achieve this goal. The post-term script asked if the first assignment, other assignments, or any other aspect of the course helped respondents to achieve or change their goal. The post-term script also asked respondents if their thinking about integrating emergent technologies for learning on demand had changed over the course of the term.

A second coder was employed to establish the coding framework, as well as coding reliability and agreement. Twenty-five percent of the interviews were co-coded, yielding a total of 1,775 units (one unit=one sentence). Seventeen percent of these interviews were first coded independently, producing an average of 146 units per interview. Independent coding results averaged 92.4% and 0.956 Kappa Coefficient agreement levels.

This summary of mid- and post-term qualitative results considers the three most-discussed emergent technology integration empowerment categories in this study, which are the instructional (25.4% of all coded units), environmental (19.8%), and curricular factor categories (11.2%). Summary of these top three categories are presented from the highest to lowest frequency of unit numbers. Mid- and then post-term results are presented to capture profile changes over the term.

Typical respondent profile.

Nearly a quarter (24.8%) of the typical interviewee's mid-term conversation focused upon instructional factors that empowered her to integrate emergent technologies for learning on demand. The most discussed instructional factor was the encouraging use of technology. The next prevalent topic was her instructor, whom she believed encouraged her to integrate emergent technologies. The topic containing the third most units was about how learners in the class, including her, encouraged her to integrate emergent technologies. Although almost half (45.8% of post-term empowerment units) of her post-term interview dwelt upon instructional factors, the order of priority between her three top mid-term instructional factors remained the same during the post-term interview.

The second greatest number of empowerment units was in the environmental factors category (24.0% of mid-term and 27.9% of post-term empowerment units). In the typical interviewee's mid-term discussion on these factors, the two most likely conversations regarded her workplace. She mostly discussed how currency and Pro-D empowered her to integrate emergent technologies for learning on demand. She usually went on to consider how the general workplace environment empowered her to integrate these technologies. The third most common discussion concerned how being self-motivated encouraged her to learn how to integrate emergent technologies. At the end of the term, she still talked the most about how workplace currency and Pro-D empowered her. Nonetheless, her conversation about how self-motivation empowered her now took second place. Her third most likely post-term discussions were evenly split between how keeping herself relevant with emergent technology integration practices encouraged her and how formal school factors disempowered her.

Curricular factors were the third most-talked about subject (18.6% of mid-term and 11.5% of post-term empowerment factors). The typical respondent's mid-term interview contained a number of curricular changes that she felt would empower her to integrate emergent technologies. First she thought that, in general, the MEd DE program encouraged her to integrate emergent technologies. Secondly, any program attempt to make her emergent technology integration learning relevant to the rest of her life was also encouraging to her. Finally, the third most likely conversation was about program factors that disempowered her. The order of her first two mid-term topics switched in the post-term interview. The third most likely topic she discussed during the final interview included course factors in the program that empowered her to integrate emergent technologies for learning on demand.

Merged Quantitative and Qualitative Results

This final summary sub-section includes highlights from the merged quantitative and qualitative data results on the typical respondent's preferred learning paradigm, perceived emergent technology mastery level, most-commonly discussed technology integration factors, scaffolding and learning curve ratings, and change in thinking. The chapter then closes with a few final conclusions.

Typical respondent profile.

At the beginning of the term, the typical respondent (who was most likely a female student) indicated a slight preference for a behavioural paradigm/P learning environment, but by the end of the term, she showed a moderate preference for a perceptual paradigm/H learning environment. She also perceived that her mastery of emergent technologies had improved slightly over the term from the early practice to mid-practice level. She disagreed about needing more scaffolding to integrate emergent technologies than most of her classmates, or having experienced a greater learning curve than them. While she was not sure if her thinking about the key factors that most empowered learners to integrate emergent technologies on demand had changed as a result of having completed the course, cumulative quantitative and qualitative data indicated that she had experienced a significant change in thinking.

Conclusion

This chapter included a review of all salient quantitative, quantitative, and merged data results derived from 24 questionnaires and 24 interviews with student participants, interviews with the two course instructors, and notes from in the researcher's journal. The results reported herein are intended to support the following chapters, although all data results are available for review upon request.

The key point presented in this chapter is that there were notable respondent differences from the beginning to the end of the term. For instance, when the term began, over half of the respondents showed a slight preference for a behavioural learning paradigm. Upon completion of the course, though, most respondents indicated a moderate preference for a perceptual paradigm. Furthermore, most respondents perceived themselves to be at a practice level in mastering the integration of emergent technologies when the term began, but by the end of the term those preferring a perceptual paradigm had reached the competency level. The following discussion chapter will consider reasons for why these patterns and other aforementioned results may be.

Chapter VI: DISCUSSION

This chapter discusses results reported upon in the previous chapter. Chapter 6 opens with a brief consideration of demographic findings. Next, it moves on answering each sub-question raised in the study, based upon the findings presented in Chapter 5. The discussion culminates by addressing the overarching research question, "What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?" Throughout this dialogue, respondent verbatim quotes and other relevant resources are called upon to extend and enrich the discourse.

Before delving into discourse on the various findings in this study, a discussion on the saturation of participant responses should be addressed. According to Cohen, Manion, and Morrison (2011), "(s)aturation is reached when no new insights, properties, dimensions, relationships, codes, or categories are produced even when new data are added" (p. 610). Nevertheless, determination of whether or not saturation is reached is intuitive, inexact, and therefore subjective (Castro, et al., 2010; Cohen, Manion, & Morrison, 2011). Moreover, critical pragmatists recognize that truths cannot be generalized beyond the situational context in which a study is conducted. Thus, these caveats must be kept in mind when broaching the subject of saturation in this project.

There was an insufficient number of quantitative questionnaires (N=24) to claim that statistical significance had been reached in this study. There were also a limited number of interviews (N=24). This yielded a very small sample of respondents who consistently adhered to a behavioural or perceptual paradigm. On the other hand, the triangulation of data from seven sources did produce a thick, rich picture of the phenomena under study. Furthermore, the main qualitative coding themes and sub-themes were identified by the time that the third interview had been co-coded. When the eighteenth interview was randomly selected to determine intra-coder reliability, it was noted by the two researchers that no new categories, codes, or sub-codes were being generated. If triangulation of data from so many sources and the lack of need to add to the coding framework are indications of saturation, then it may be concluded that saturation was reached in this study.

Demographics

Most respondents in this study tended to be older than other online learners in other studies. Dissertation respondents were between the ages of 35 and 59; one third were between the ages of 50 and 54. In a similar mixed methods study conducted from 2010 to 2012 with 695 graduate level students at the same online institution, 54% of the respondents were between the ages of 35 and 49 (Ally et al., n.d.). A nationwide American study on 1,500 bachelor and graduate level students reported that most respondents were around the age of 35 (Aslanian & Clinefelter, 2013), although it did not provide specific age statistics for graduate-level students.

Three quarters of the respondents in this dissertation project were female, 16.8% were male, and one opted to not respond to the gender question. Yet in the 2010 to 2012 study on graduate students at the same university (Ally et al., n.d.) only 62% were female, and in the Aslanian and Clinefelter (2013) study, 53% of online graduate participants were female. Nevertheless, the respondent gender ratio was a fair representation of the two courses included in the dissertation, as total gender percent for both courses according to the instructors was 85% female and 15% male.

Forty-two percent of participants in this study and the Ally et al. (n.d.) study lived in urban centers (population over 500,000); 40% of the Aslanian and Clinefelter (2013) participants were also from urban centers. Other population distribution figures between the dissertation and Ally study were also very similar; the Aslanian and Clinefelter study had dissimilar location by population breakdowns beyond the urban population category, making it difficult to draw conclusions about other population similarities.

Lastly, 42% of dissertation participants had completed five or six courses, and 34% had completed seven or more before the term began, whereas 47% of participants in the

Ally et al. (n.d.) study had completed seven or more courses. While the figures between these studies were similar, it is not possible to draw definitive conclusions about this demographic because the Ally study included many graduate programs, each of which had a unique number of courses. It is possible to conclude, though, that most dissertation participants had a fair amount of experience with online learning at the graduate level by the time that they participated in this study.

Overall, dissertation participant demographics were very similar to those involved in the Ally et al. (n.d.) study and fairly similar to those in the Aslanian and Clinefelter (2013) study. Nevertheless, dissertation participants tended to be somewhat older and more representative of the female gender than the other two studies cited herein.

Key Factors

Question 1 asks, "What are the key institutional, curricular, instructional, and other contextual factors that empower the learners in this study to integrate emergent technologies for learning on demand? Will these perceptions change as these learners progress through the course?" This question is answered by using qualitative coding results from the interviews. The discussion begins by addressing the first part of this question.

Identifying key factors.

A total of 3,195 units were coded from all mid- and post-term interviews. Four out of five of these (N=2,553 units; one unit=one sentence) were categorized as emergent technology integration empowerment units. Discussion of coding results begins with the ten most empowering and disempowering factors and then considers prevalent cross-category factors.

Key empowerment factors.

Three quarters of all empowerment units were encouraging, 18% expressed a lack of encouragement, and the remaining 7% were of a neutral nature. The most encouraging and greatest lack of encouragement factors from mid- and post-term interviews were aggregated to determine the cumulative top ten for each type of unit throughout the term.

Ten most empowering factors.

The cumulative top ten encouraging factors from all coded respondent data represented 27% of all empowerment units and over 36% of all encouraging units. Of these, the most encouraging factor identified was the instructional use of technology, which represented one quarter of all encouraging units on the list (24%; Figure 25). Being responsible for one's own learning was second (N=18% of all encouraging units on the list). The instructional use of assignments was third (16%). Suggested MEd DE curriculum changes was fourth on the top ten list (just over 8%), with the instructor's instructional role following close behind (8%).

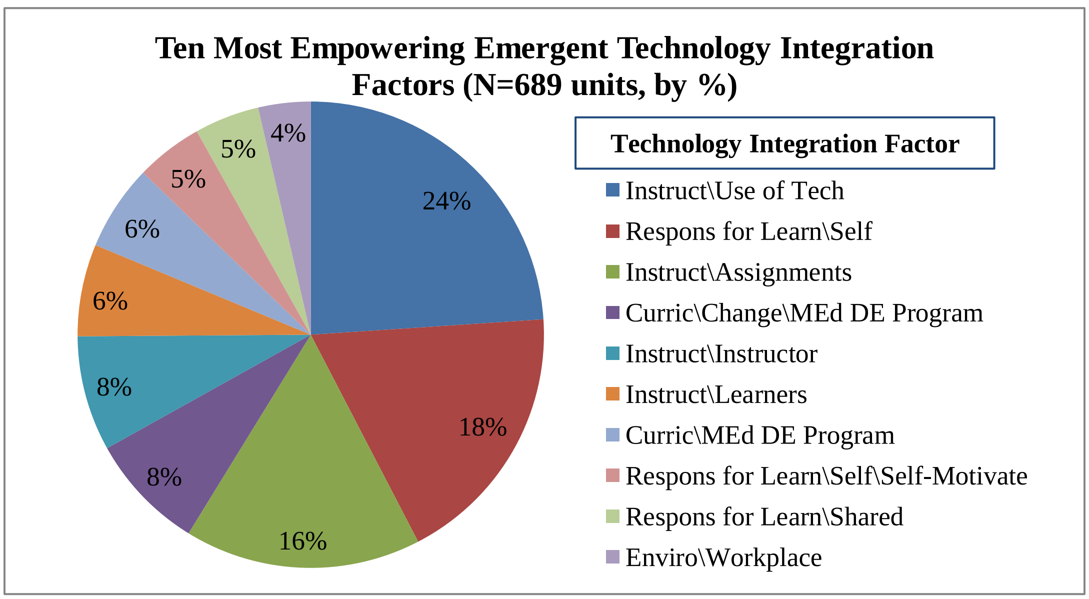


Figure 25. Mid- and post-term top 10 encouraging emergent technology integration factors (689 units, by percent).

The instructional role of learners (over 6%), the MEd DE program curriculum (6%), the responsibility of being self-motivated (4.6%), shared responsibility for learning (4.5%), and the general workplace environment (3.6%) rounded out the top ten most encouraging emergent technology integration factors.

Ten top lack of empowerment factors.

The top ten lack of empowerment factors were also determined by compiling lists containing the highest number of units among these factors. The cumulative top ten lack of empowerment factors represented eight percent of all empowerment units and 42% of all lack of empowerment units across the term. An aggregated list of all mid- and post-term units for both courses indicated that the instructional use of technology was the least, as well as the most empowering factor (26% of top ten lack of empowerment factors; Figure 26).

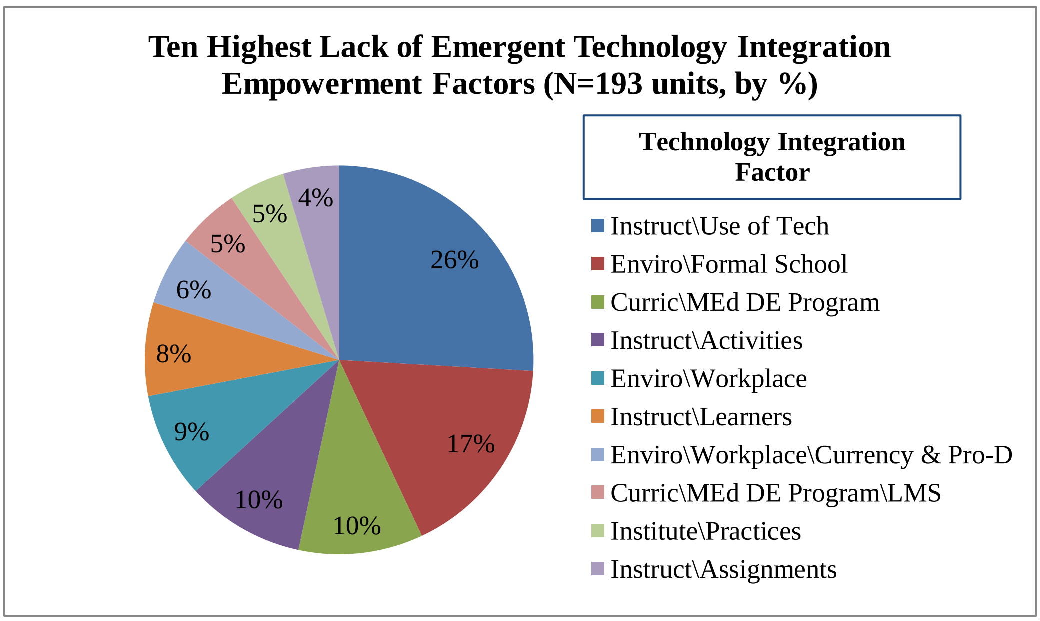


Figure 26. Mid- and post-term top ten emergent technology integration lack of empowerment factors (193 units, by percent).

Formal schooling was the second least empowering emergent technology integration factor (17% of top ten lack of empowerment factors).The program curriculum was the third least empowering (over 10%). Instructional activities were fourth (10%) and the general environmental workplace was fifth (9%). The instructional role of learners was sixth on the ten top lack of empowerment list (8%), while workplace currency and Pro-D was seventh (6%). The program LMS was eighth (just over 5%). Institutional practices and instructional assignments tied for the final positions on the top ten list (almost 5% each).

Cross-category empowerment themes.

The qualitative results summary section in Chapter 5 included the identification of four prevalent cross-category emergent technology integration empowerment themes (Figure 19). The most empowering and disempowering of these thematic factors was use of emergent technologies (53% of thematic units). Many respondents believed that they were best able to integrate various course-related emergent technologies when they were expected or encouraged to use these technologies for course activities and assignments. For instance, this is what one respondent had to say:

> [The instructor] allowed me to do an assignment where I am using a technology. I will be creating a lesson that I can use in my classroom using multimedia elements. I am an online teacher, so I am actually creating a virtual fieldtrip with my students to a senior's home. As well another project will involve an artist who is coming into my online classroom. We will be doing a synchronous broadcast and recordings at the same time. This assignment allows me to use the technology and to create an assignment I can use in a real classroom setting. This hands-on project will be applicable, informative, and improve my technology skills at the same time.

Other respondents felt disempowered by the limited use of emergent technologies in the program. This concern was illustrated by another respondent's comment:

> So if you don't really know what [emergent technologies] are and what they can do, it is kind of hard to even know where to go for some support, or where to start. I would like to see more emergent technologies used in this course and other courses that I have taken. I don't think they are really used all that much.

The general sentiment expressed by many respondents in both courses was that they appreciated studying theoretical and research-based aspects of emergent technology integration. Yet they felt that their understanding was greatly enhanced when the courses gave them opportunity to apply this knowledge in meaningful ways. Closely related to the use of technology empowerment theme were relevancy (22% of thematic units), accessibility (14%), and currency and Pro-D (11%) factors.

Most relevancy-themed comments indicated the desire to bind curricular and instructional processes and products with workplace and PLE emergent technology integration aims. For example, one interviewee said, “[I]f you want to engage students, a technology needs to be presented in a way that people can clearly understand its impact and how it can make a qualitative difference in their life.”

Conversations around access to emergent technologies generally related to how the government or the institution should ceaselessly strive to provide modern freely-available or inexpensive and easy-to-obtain infrastructure, hardware, and software to learners.

The final prevalent cross-category theme was currency and Pro-D. Many of comments in this thematic area focused on positive changes that would enhance emergent technology integration among instructors and learners. Some respondents felt that the government and institution were one to two decades behind their workplace and general society in this area. Suggested changes included revising federal and provincial educational policies and initiatives to reflect the current technological environment, and to provide a dynamic roadmap for the future. Improved funding policies and increased funding practices were typically part of this conversation. Institutions were further charged with providing access, funding, release time, and other incentives to instructors so that they could better integrate emergent technologies into their courses. The following excerpts from various interviewees offer further context on the currency and Pro-D empowerment theme:

> [1] So I think that bringing governments up to speed; they are so slow. They are 10 to 15 years behind us.

> [2] I think that we need a better plan. I really don't think that we have a plan. Let's face it. Canada doesn't have a national or federal Ministry of Education. So there is no road map. In institutions… even in our institution where I work, we have no plan for professional development when it comes to technology… Government probably needs to provide leadership. I think that needs to be done with foresight – the next twenty years, forty years, fifty years, or whatever that might be.
> [3] So, for changing and upgrading curriculum, the government, and also at the institutional level, having proper funding, training, and support is important.
> [4] It would be nice if Athabasca U. did address the sort of hesitation among teachers and administration for integrating technology in a more productive way.
> [5] So there has to be regular training, regular updates that need to be ongoing in order to integrate these technologies now or in the future, to maintain and use the technology efficiently and effectively.

Key mid- versus post-term factors.

The second half of Question 1 asked if respondents' perceptions about the key factors that empowered them to integrate emergent technologies on demand had changed over the term. A review of the ten most empowering and disempowering emergent technology integration factors across the term was undertaken to answer this question.

Ten most empowering factors.

The top ten mid- and post-term encouraging units constituted 30% of all empowerment units and 44% of all encouraging units for this course during the term. The mid-term list of encouraging factors represented 14% of all empowerment units, 18% of all encouraging units, and 40% of all mid-term encouraging units. Being responsible for one's own learning (18% of the mid-term top ten encouraging factor units list) came first on the top ten mid-term list of factors that encouraged respondents in this study to integrate emergent technologies for learning on demand. The next two highest factors tied for second and third place on this list. They were the instructional use of technologies and assignments (15%). The fourth most prevalent factor on the list was the MEd DE program curriculum (12%), and the fifth highest factor was curricular changes to the program (10%). Shared responsibility for learning was sixth on the list (9%), the general workplace environment was seventh (7%), and the self-motivating factor generated from being responsible for one's own learning was eighth (6%). Ninth and tenth places were shared by two instructional factors; these were the encouraging roles that the instructor and learners played (5% each).

The top ten post-term factors that encouraged respondents to integrate emergent technologies for learning on demand constituted 17% of all empowerment units, 23% of all encouraging units, and 45% of post-term encouraging units. Six of the top ten most encouraging factors on the mid-term list were also found on the post-term list, although the order of priority of factors and the number of units assigned to each factor had changed. By the end of the term, the encouraging instructional use of technology had moved from sharing second and third place on the mid-term list to topping the post-term list of the ten most empowering factors (26% of the post-term list of encouraging factor units). Being responsible for one's own learning had moved from first place on the mid-term list to second on the post-term list (15%). The instructional use of assignment remained in third place (14% of encouraging units on the post-term list). The encouraging roles that the instructor (11%) and learners (9%) played in helping respondents to integrate emergent technologies for learning on demand had moved from being ninth and tenth on the mid-term list to fourth and fifth on the post-term list (11% and 9% of units on the post-term list, respectively). The final encouraging factor common to both lists was curricular changes to the MEd DE program, which had slipped from fifth place on the mid-term list to seventh place (5% of units on the post-term list).

The remaining four encouraging emergent technology integration factors from the mid-term list had been replaced with four new factors on the post-term list. Workplace currency and Pro-D factors were sixth on the top ten post-term list (7%), curricular changes to the program were seventh (5.2%), and change in thinking about instructional factors was eighth (4.5%). Formal schooling was ninth on the post-term top ten encouraging factors list (4.3%), and the instructional use of activities was tenth (4.1%)

Ten top lack of empowerment factors.

The aggregation of mid- and post-term lists of the top ten lack of empowerment units represented 8% of all empowerment units and 46% of all lack of empowerment units. The mid-term list of the ten most disempowering factors contained 5% of all empowerment units, 26% of all lack of empowerment units, and 46% of mid-term lack of empowerment units. The disempowering instructional use of technologies was first on the mid-term lack of empowerment top ten list; this factor represented nearly one quarter (23%) of all units on the list. The factor containing the second greatest number of mid-term lack of empowerment units was the MEd DE program (17%). Third on the list were disempowering factors associated with formal schooling (11%). The fourth most-commonly discussed disempowering factor was the LMS in the MEd DE program curriculum (8%). This was followed by the three factors that shared fifth, sixth, and seventh place on the list. These factors were the instructional use of activities and assignments, as well as institutional practices (each possessing 7.5% of the mid-term top ten lack of empowerment units). Eighth and ninth places were also shared, this time between the general workplace environment and government changes (6.7% each). The final factor rounding out the mid-term top ten lack of empowerment list was institutional policies (6%).

The ten post-term factors that most disempowered respondents to integrate emergent technologies for learning on demand represented 4% of all empowerment units, 24% of all lack of empowerment units, and 57% of all post-term lack of empowerment units. Four mid-term lack of empowerment factors were also found on the post-term list. The disempowering instructional use of technologies continued to retain first place on both lists (containing 21% of all post-term top ten disempowering factor units). The disempowering role of formal schooling factor had risen from third place on the mid-term list to second on the post-term list (18% of units on the post-term list). Instructional activities remained in fifth place on both lists (9% of units on the post-term list). The final factor on both lack of empowerment lists was the general workplace environment, which had risen from eighth place on the mid-term list to sixth place on the post-term list (8% of post-term list units).

Six new factors were found on the top ten lack of empowerment post-term factors list. The disempowering instructional role of learners was third on the post-term list (14% of units on the post-term list), while workplace currency and Pro-D factors were fourth (10%). The seventh highest lack of empowerment factor was the instructor’s instructional role (6%); the eighth was workplace colleagues (5%). Finally, there was a tie between the MEd DE program curricular course design and government policies for ninth and tenth places on the post-term most disempowering factors list (5% each).

Summary.

Question 1 was divided into two parts. The first part asked what key institutional, curricular, instructional, and contextual factors empowered the learners in this study to integrate emergent technologies on demand. For this summary, a synthesized response to this first sub-question was derived by first aggregating encouraging factors having the ten greatest numbers of units into categorical themes. This resulted in the identification of three mid-category level themes, with one factor left over. The findings were then merged with the encouraging units from the four cross-category themes to produce a list of the most empowering emergent technology integration thematic factors. These thematic factors represented half of all coded units and two-thirds of all encouraging units.

The most empowering emergent technology integration factor possessed nearly one third of all encouraging units in the composite list described above, and nearly twice as many units as the theme with the next highest number of these units. This dominant theme was use of technology (31% of the units on this list; Figure 27). A pervasive sentiment found within this theme was the need by all stakeholders, especially instructors and learners, to employ emergent technologies in practice. While many respondents greatly appreciated studying theoretical concepts and research-based content, they felt that there was a deep void in their learning due to the lack of practical application. To illustrate, one respondent said, "I think that [emergent technologies] would empower me if there were more of them infused in all of the courses…the need to use technology in the assignments." There were many positive comments among those who were given the opportunity to practically apply what they were learning:

> [1] I think because it makes you see the practical application of the mobile learning; the mobile learning in practice in work. As it is working itself out you get a sense of its not theoretical anymore, its practical and you can see what it would be like from a student's perspective and also get a sense of what its shortcomings might be as well.
>
> [2] Not only do we have to find the tools that will work for collaboration, but then we also have to actually use them regularly multiple times so that we get to practice using them and finding the different things that those tools can do.

Conversations containing encouraging units typically branched in two directions. The first included comments about how the current use of some technologies, such as the LMS used by the institution, enabled them to remain organized and communicate with others, as well as gave them opportunity to see how this system could be used in work-related environments, as illustrate by this comment:

> Because the LMS has a mobile application, you can access it through mobile devices. So I guess that helps to learn about how a learning management system could be used and maybe the shortcomings about it as well. Also, it enables me to access and to keep tabs on things that are going on in my course. Whenever I have a little bit of time, I can use it to find out what's happening, what has been posted

> recently. So it allows me to be able to fit my learning into the spaces that I have for learning and the times that I have.

The other discussion focused on how the use of these technologies enabled stakeholders to maintain relevancy, currency, and access to the rest of the world. As one respondent explains:

> There's theory woven into practice and there are also opportunities for applying what you are learning about mobile learning to your particular situation. So whether you are an instructor, or a learner, or you are maybe in administration to be able to find connections between what you are learning and your personal situation.

The second dominant theme, containing almost one-fifth of the encouraging units on the list, came from the responsible for learning category. This theme focused on how controlling their own learning helped empower respondents to integrate emergent technologies for learning on demand. Three factors were identified within this theme. General comments about self-responsibility for learning constituted over half of the encouraging units in this theme. One quarter of the theme units centered on the encouraging role that self-motivation played. The final fifth of these units included discussions on the empowering effect teaching oneself had on promoting emergent technology integration. The following quotes exemplified typical comments made within the context of this theme.

> [1] The responsibility I believe lies within all of us to push ourselves, to actually learn new things. There is no excuse for it now, especially with the Internet and access to virtually limitless resources as far as personal training and growth goes.
>
> [2] I have to be driven enough to integrate those things. The responsibility lies on me to stay with the trends, with the latest trends. And in the foreseeable future, I think it is probably me or myself is probably the key there.
>
> [3] And I have my own reasons for wanting to integrate this stuff.

> [4] The responsibility I believe lies within all of us to push ourselves, to actually learn new things.
>
> [5] I consider myself a self-learner, if that makes sense… I self-teach myself how to use a lot of the tools and technology.

The next two themes each had over one fifth of the units on the thematic list. The cross-category theme, relevancy, contained slightly more units than the category theme, instruction. Discussions relating to relevancy typically focused upon the reasons for, and the responsibility of stakeholders to maintain relevancy in a world of perpetually-emerging technologies and unpredictable trends:

> [1] Curricular, it has got to be latest trends or relevant trends. I mean what everybody needs; the latest, but they need to be relevant to the curriculum.
>
> [2] In terms of the curriculum itself, I wish AU would refresh its courses at a lot quicker pace, in order to make the content, as well as the readings a lot more relevant and time appropriate… The biggest change would have to be ongoing curriculum redesign, or ongoing tweaking of content, in order to keep it highly relevant and current.
>
> [3] That's my professional development so whether I do it at work or whether I do it on my personal time, I do want to stay relevant as a professional.

Three key instructional factors were included in the original top ten empowering factors list. Use of technology was removed from this list though when the new thematic list was created, because the instructional use of technology units were already included in the cross-category theme, use of technology. Therefore, the instructional theme consisted of units from two remaining factors, assignments and activities. Seven out of ten instructional theme units were related to assignments. Respondents felt most empowered when assignments were tailored to include the use of emergent technologies relevant to their lives or enhanced group collaboration, as reflected in these quotes:

> [1] …[T]he courses that I am able to choose is helping me to look at the course, look at what I have to do and the assignments in it, and allow me to do what I need to do for my work to integrate whatever technologies I need.
>
> [2] It's been primarily the courses and the professors that allow you to tailor the assignments to something that might be more applicable and more hands-on than writing an essay.
>
> [3] I would say mainly the assignments because needing to collaborate in the assignments has forced my group to find tools and technologies to help us collaborate online and also to find tools and technologies that we are going to use in a future assignment to modify a course.

Three out of ten instructional theme units were about activities. Many of the activity-based conversations underscored the relationship between interaction and the use of emergent technologies, as illustrated by these respondent quotes:

> [1] But just by participating, you become more comfortable and so I guess in that way, it empowers you to use and integrate emerging technologies.
>
> [2] Although I typically post using a laptop rather than using a mobile device, I do keep tabs on what is going on in the discussion forums using my mobile device so that helps me to integrate emergent technologies on demand.

Next on the list of most empowering emergent technology integration factors was the cross-category theme of accessibility, which held eight percent of the units on this list. Typical conversations about accessibility were presented as suggested government, institutional, curricular, and workplace changes that would enhance learner integration of emergent technologies:

> [1] That is a good question. I have a very short answer here. [Laughs] I wrote access, cheap access, innovation, availability, and bandwidth. I think that on the government or institutional level, it is definitely access. Government, you are talking about maybe guaranteed access, minimum access, and free down the road,

hopefully maybe someday. Institutional, again, you have to have the infrastructure in place to handle these demands.

[2] Also, more access to tools so that students and learners can actually have some of the tools, have some of the applications and the software that would be needed to actually explore.

Nearly seven percent of the encouraging theme units were found in the environmental sub-category, workplace. Three workplace factors made the original top ten factors list. However, one of these factors was also included in the cross-category theme, currency and Pro-D, so it was excluded from the workplace theme on the thematic list. The two remaining workplace themes were general workplace comments and colleagues, which shared an almost even number of units. Examples of the empowering nature of the general workplace and colleagues included the following comments:

[1] It's my work environment and society that empowers me to keep up with technology, but I use the AU program to support those goals in whatever way I can.

[2] As an e-learning librarian, I am always on the lookout for tools that are becoming available to see whether or not they can be leveraged to develop e-learning or whether they can be used in the classroom environment. So I do a lot of testing and my colleagues do as well. So that is an environment that is very conducive to integration and testing of potential new emerging technology.

[3] [M]ainly it was fellow classmates letting me know of technologies they have used and also colleagues suggesting tools and technologies that they have used for a variety of purposes, often for in the classroom. Because they allow for practice and because of getting suggestions from people that I know and really respect makes a big difference to what I am going to try.

Over six percent of encouraging units on the thematic list came from the cross-category theme, currency and Pro-D. Discussions about this theme were found in five of the eight empowerment categories identified in this study. Some of this discourse was about the role that government, institutions, and employers played in ensuring that administrators, instructors, learners, and learners' colleagues remained conversant with relevant emerging technologies. A second discussion thread focused on the responsibility that respondents had for maintaining their own currency and professional development in this area. Examples from both conversation threads were drawn to illustrate this theme:

> [1] I think that higher education institutions can try to help us with current access to sites that can help support our learning of technology, like in the MDDE [name of course] that introduces us to CAI training and access sites such as Lynda.com (that is evolving quickly because there is a technological company with it).
>
> [2] Outside of my school teaching online, I am also starting a company where I am developing e-learning resources and, because of that, I have to explore more technologies, especially mobile technologies and technologies that use things like NFC chips and things like that in mobile usage.

The final theme on the most empowering list was curricular changes to the MEd DE program (6% of units on this list). Encouraging suggestions most often included: updating the program, making it more relevant to learners, improving course design, integrating more emergent technologies into instruction, incorporating a multi-discipline approach to broaden understanding and access to emergent technologies, replacing the heavy reliance on .pdfs and electronic texts with multimedia resources, and allowing more hands-on opportunities to learn about these technologies. The following excerpts were demonstrative of such conversations:

> [1] It would be interesting to have some courses that would actually look at that implication and so where we are headed, and how we can deal with some of the issues that technology does bring as well.
>
> [2] So if integrating emergent technology on demand can help them learn easier, then I think it should be incorporated into the curriculum.

> [3] I think that they would empower me if there were more of them infused in all of the courses…the need to use technology in the assignments. And also for the content to be displayed in formats other than .pdf files, Word documents and static web pages. I would suggest more multimedia-based design of the curriculum, more interactivity with the interface along with the instructor themselves, and even the use of synchronous technologies.
>
> [4] I had hoped overall the whole Masters' program would have addressed more of these goals that I had placed, the majority of them being more of a hands-on approach and implementing and using these technologies, rather than researching and studying and discussing them.

To summarize the reply to the first part of Question 1, the most empowering emergent technology integration thematic factor is the use of emergent technologies in online instructional and PLE environments. Being responsible for one's own learning, including self-motivation and teaching oneself is the second most empowering thematic factor. These two thematic factors represent nearly half of the most empowering factors discussed in this summary section. The role of all stakeholders in establishing the relevant integration of emergent technologies is the third most empowering thematic factor. The instructional use of assignments and, to a somewhat lesser extent, activities are next; these two thematic factors represent one quarter of the most empowering thematic factors list. The remaining factors on the list each portray less than ten percent of the list. In order of priority, starting with highest number of encouraging units, these remaining thematic factors are: the workplace environment (including general workplace and colleague factors), the cross-category theme of currency and Pro-D, and lastly, curricular changes to the MEd DE program, such as improved course design, better integration of emergent technologies, and use of multimedia resources, as well as the adoption of more multi-disciplinary and hands-on approaches to technology integration.

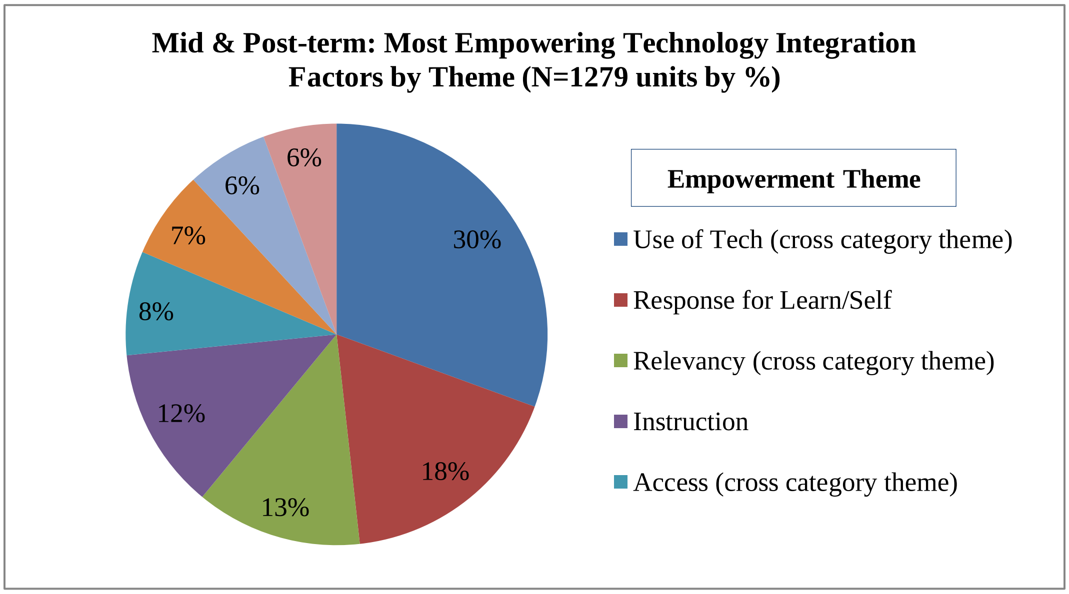


Figure 27. Mid- and post-term: Most empowering emergent technology integration factors by theme (1279 units by percent).

A thematic synthesis of the top ten lack of empowerment units for both courses across the term represented less than one out of ten of all empowerment units, and almost half of all lack of empowerment units. The most prevalent lack of empowerment theme was instruction, which contained nearly half of the top ten lack of empowerment units. Half of these thematic units belonged to the use of technology factor. Disempowering comments about this factor typically reflected respondents' disappointment about the sparse integration of emergent technologies in instruction, as illustrated by this statement, "I signed up for the course wanting to be more literate in the physical technologies, but then I realized that it wasn't going to be like that for the course." Two out of five of the remaining instructional units were related to other learner or activity factors. The following comments were typical of such statements about these disempowering factors:

> [1] They come from a particular paradigm and I think, because of that, they have certain blind spots… But I felt, and maybe it is because of the politeness of the online environment, there are lots of times you might try to challenge somebody and the person would just walk away from those challenges.
>
> [2] The activities, again, I wouldn't find very emergent technology-driven.

> [3] After having assessed what I learned, I'm not sure if there is anything done in this class I haven't tried before, so most of the activities are not new now.

One out of five units in the instructional theme was an assignment factor. Again, the prevalent concern was about the lack of opportunity to integrate the use of emergent technologies:

> The odd time professors allow you to approach the assignment from novel ways such as actually creating a resource that could be used in your classroom or workplace. However, the vast majority of the assignments are focused on writing reports and answering questions. Instead of actually using the technology we are simply writing about it. This is not an effective approach to learning in the 21st Century; universities must change with the times.

Slightly over a third of the top ten lack of empowerment factors had an environmental theme. One third of the units within this theme were associated with the shortcomings of formal schooling, as these quote illustrated:

> [1] And now people are starting to turn away from that because the universities not being as hands-on, not being as practical, and not providing an education that is necessarily always the best to find work with.
>
> [2] I would say again that, school, I have already addressed this, not much happening there in terms of technology.
>
> [3] When I think about how I had to, every fall, pack up my gear and textbooks in my truck and travel across the country, find a place to live, all of this kind of stuff, and how difficult and costly it was, now I can go online and eliminate all of that stuff.

The remaining two thirds of the disempowering environmental theme were almost evenly split between three workplace factors: general workplace, currency and Pro-D, and colleagues. How these factors deterred respondents' integration of technologies was exemplified by the following comments:

> [1] In institutions… even in our institution where I work, we have no plan for professional development when it comes to technology. For example, we have an LMS, but it is not even mandatory to be used by everybody, not even the most basic functions.
>
> [2] The workplace philosophy and supportive peers and colleagues I think is huge in terms of integrating it into teaching, because if you don't have that supportive atmosphere and the philosophy of wanting to move forward as a whole school, it's like trudging through mud I guess.
>
> [3] And then having to use [an emergent technology] on demand, which can be difficult for some based on my observations in terms of the people that I work with.

The final fifth of units on the top ten lack of empowerment list belonged to the program curriculum theme. Two thirds of these units contained general comments about the program; the remaining third focused on the course design. Typical comments included remarks such as:

> [1] I would prefer seeing more assignments that would integrate emergent technologies.
>
> [2] I haven't found any new tools that were introduced to any new tools in my journey with Athabasca U that I would call emergent. So they don't empower me; lack of empowerment.
>
> [3] Well, I feel like if I knew more about what specifically we would be examining in the course beyond the vagueness of the outcomes… I understand the vagueness as there are the professors who put their own spin on things and technology changes, but if I knew more about what was going on there, I would be able to plan my education more appropriately to my needs. So that's more of a disempowerment in terms of frustration.

In conclusion, it is the use of emergent technologies in instructional and workplace settings that most empowers and disempowers respondents to integrate these technologies for learning on demand. The deepest, most thorough understanding of these technologies is derived when respondents are able to marry theory and research with relevant practical application of emergent technologies.

The second half of the question asked if respondents' perceptions of key emergent technology integration factors would change over the term. The response this question was yes, to varying degrees.

Overall, the percentage of units on the top ten encouraging factors list increased by 4% from mid- to post-term. While six of the top ten mid-term factors were also found on the post-term top ten list, the percentage of units for each factor had changed. Moreover, only one of these six factors retained the same position on both lists. This was the instructional use of assignments, which held third place on both lists. The number of instructional use of technologies factor units had increased 11% from mid- to post-term, thus topping the list by the end of the term. The instructional roles of the instructor and learners had also risen from sharing ninth and tenth places on the mid-term list to fourth and fifth places on the post-term list. Finally, curricular changes to the program dropped from fifth on the mid-term list to seventh place on the post-term list. Beyond these similarities, no seemingly identifiable patterns or trends were obvious between the lists. However, as results collected to answer subsequent research questions were analyzed, explanation for changes over the term regarding what factors participants felt most empowered learners to integrate emergent technologies on demand emerged.

Paradigms and Technology Integration

Question 2 asked, "Is there a difference in technology integration levels between the learners in the study who identify a preference for a traditional teacher-directed learning paradigm or a learner-determined one, or who appear to be in the midst of a paradigm shift? If so, what key learner-identified factors are most likely associated with the reported differences?" The response to this two-part question was derived from assessing aggregated data results, described in the merged quantitative and qualitative results section of Chapter 5. The reply to the first part of the question is given first.

Technology integration levels versus paradigms.

Results from individual participants' perceived level of mastery with 16 different emergent technologies were sorted according to their paradigm profiles to provide an overall picture of respondents' perceived level of emergent technology integration mastery in relation to their preferred learning paradigm. (Rating levels were from 0 to 5: 0=no response, 1= little knowledge, 2=acquisition, 3=practice, 4=competency, and 5=capacity). According to these results, all participants shared very similar early-term technology integration mastery ratings (P and Shifting=3.3; H=3.2), indicating that they were, on average, a bit above the practice level with these technologies. By the end of the term, though, H participants had achieved the competency level (4.2), the shifting paradigms participants indicated a minor increase (3.4) from their mid-term practice level, and the P participants had experienced a decline (2.8) from their previous practice level. One possible explanation for the post-term results was that P participants did not set personal emergent technology integration goals for the term, while the shifting paradigm and H participants did. The paradigmatic mindset that may have affected participants' ability to acquire higher levels of emergent technology integration during the term was illustrated by these two disparate comments:

> [P respondent] I did not with this course and I was actually a little perplexed by that question just because it's an online teaching and learning course about online teaching and learning, but it is not really a course specifically about technology. So, it wouldn't be a course where I would set that type of goal because I am not going to learn about new technologies in it.

> [H respondent] The goal is my own. It was to be able to create something that I am going to be able to use in the workplace. So I guess that I was focused right at the beginning.

Technology integration levels versus key factors.

The second half of Question 2 asked what key learner-identified factors were most likely associated with the differences in technology integration levels between participants who preferred one learning paradigm over another. The response to this inquiry included a comparative review of key empowerment factors by preferred learning paradigms. Factors with the five highest number of empowerment units were determined to be the key factors for the purpose of this discussion.

The comparative analysis of the emergent technology integration factor lists possessing the top five number of empowerment units between respondents who preferred a behavioural or perceptual paradigm, or who appeared to be in the midst of a paradigm shift produced some interesting findings about the acquisition of higher levels of technology integration and learner empowerment. The most profound discovery was the disparity between the top five factors on the P list as compared to the H and shifting paradigm lists (Figure 24, Chapter 5). Four of the five top empowerment factors on the P list were disempowering factors; all of the top five factors on the other two lists were encouraging factors. Secondly, no P factors were included on the other group lists. Thirdly, the P list had included factors from the government and institutional categories; these two categories were not found on the other lists. The lack of government changes empowerment factor topped the P list. This was followed by the instructional use of technologies lack of empowerment factor. Third on the P list was the encouraging general workplace factor. These first three factors constituted three-quarters of the empowerment units on the P top five factors list. The remaining 25% of units on the P top five list of factors were evenly split between general lack of empowerment in the workplace, and the lack of institutional currency and Pro-D empowerment factors. The following quotes drawn from units in the top five P list highlighted the general lack of empowerment expressed by group P respondents:

> [1] You can't use OERs, you can't use fantastic things that are created globally for learning unless you can figure out a way to set it into a very small box of curriculum that you are permitted to use.
>
> [2] …AU institutional factors don't empower me to keep up with technology.
>
> [3] I felt that trying to focus on how to use Moodle, and I think that we are learning how to use Mahara in the e-portfolio project, which is a specific technology and it may end up being phased out… I didn't find that as useful as a process as focusing on the presentation aspects-components of a portfolio and perhaps providing some direction and support for different types of things that we could use if we wanted to versus a strict focus on one tool that I will never use again.

Three of the top five factors on the shifting paradigms list and the H list were the same. These factors were also the top three factors on both lists. The encouraging instructional use of technology factor topped shifting paradigm list, possessing 30% of all empowerment units on the list. This factor contained one fifth of the H list units, tying it with the encouraging factor of being responsible for one's own learning for second and third place on the H list. Being responsible for one's own learning also contained one fifth of the units on the shifting paradigm list of factors, putting it in second place on that list. The final factor common to the shifting paradigm and H lists was the encouraging use of instructional assignments. This factor held nearly a quarter of the H top five list of empowerment units, placing it first on that list. The encouraging use of instructional assignments contained one fifth of the units on the shifting paradigms list, thus assigning it to third place on this list.

The encouraging instructional role of the instructor factor was fourth on the H list and contained a fifth of the H top five factors units. The encouraging role that these respondents' workplace students played was fifth on the H list; this factor included 12% of the H list units.

Two unique factors tied for fourth and fifth place on the shifting paradigms list. These encouraging factors were currency and Pro-D in the workplace environment, and the MEd DE program curriculum. Each of these held 17% of the units on the shifting paradigm top five factors list.

A comparison of the top five factor lists for the three groups suggests that the lack of government changes, instructional use of technologies, and general workplace factors, as well as the lack of current institutional practices may help to explain the decrease in the P technology integration practice level over the term.

On the other hand, all factors on the shifting paradigm and H top five factors lists were encouraging factors. Secondly, the top three factors on the shifting paradigms and H lists were the same. These results may help to explain why the technology integration levels increased over the term for both groups. However, these two lists differed in two significant manners. First, almost nine out of ten units on the H list were evenly distributed between four factors within the H group's immediate PLEs. The fifth factor, the empowering role of being responsible for helping their own students integrate emergent technologies for learning on demand, was not only in the H group's immediate PLE, but also provided evidence that these H participants were learning leaders. These factors would therefore help to explain why the level of the H group's technology integration mastery increased to the competency level by the end of the term.

While the first three factors on the shifting paradigms list were also within the shifting paradigm group's PLE, the distribution of the number of units between these factors ranged from possessing one quarter to one fifth of the units on the shifting paradigm top five list. The fourth factor, workplace currency and Pro-D, as well as the fifth factor, MEd DE curriculum, were, according to the literature in Chapter 2, meso-level factors beyond the shifting paradigm group's control. These differences between the

H and shifting paradigm top five factor lists suggest that some members of the shifting paradigm group may have been struggling with who should control their learning during the term under study, and thus explain why the practice level of technology integration mastery among the shifting paradigms group increased slightly over the term.

Summary.

All respondents assessed themselves as beginning to practice the integration of emergent technologies when the term began. By the end of the term, however, there was one marked difference. Those who preferred a behavioural paradigm indicated a minor decrease in their perceived level of practice, while those who aligned with the perceptual paradigm acquired a competency level of mastery with these technologies. Respondents who appeared to be in the midst of a paradigm shift reported a slight increase in their skill level since the beginning of the term.

A list of the five individual factors containing the most empowerment units for each paradigmatic group was compiled to determine what key respondent-identified factors were most likely associated with the differences in technology integration levels between these groups. Examination of these top five factor lists highlighted apparent disparities between the P and other groups' lists. Most notably, the P list was the only list to contain disempowering factors; four out of the top five P factors were disempowering. Secondly, while the P list did not contain any factors in common with the other two lists, the top three factors on the H and shifting paradigms lists were the same. Furthermore, the P list was the only one to include factors from government and institutional categories.

Although the H and shifting paradigms lists appeared to share much in common, the distribution of units among the first four of the top five factors on the H list was almost evenly split. Secondly, the final factor on the H list was the encouraging role that being responsible for their own students played, which assisted in identifying the H group as learning leaders. Lastly, all factors on the H list were within the H group's PLE, suggesting that these respondents had control over their own learning.

In comparison, the distribution of units on the shifting paradigms list showed greater variance than the distribution of units on the H list did. Also, the final two factors on the shifting paradigms list were meso-level factors, suggesting that the shifting paradigms group may have been struggling with the balance of power over their learning during the term. The meaning related to these findings was built upon during the process of answering the third research question.

Paradigms, Scaffolding, and Learning Curves

Question 3 also had two parts. The first part asked if there was a difference in the amount of scaffolding or learning curve reported by participants who identified with a behavioural or perceptual paradigm, or who appeared to be in the midst of a paradigm shift. The second part asked what key participant-identified factors were most likely associated with any reported differences.

Scaffolding and learning curves by paradigm.

In order to answer the first part of Question 3, respondents were asked to rate their level of agreement to two post-term questionnaire statements using a Likert scale where 0=no response, 1=strongly disagree, 3=neutral, and 5=strongly agree. These statements said that the respondents: (1) needed more technology integration instructional support and scaffolding than others students did in the course, and (2) had experienced a significant technology integration learning curve during the term.

In general, respondents preferring a behavioural paradigm strongly disagreed that they required more technology integration scaffolding than their peers, or that they had experienced a significant learning curve during the term. Those aligning with a perceptual paradigm strongly disagreed that they required more scaffolding, and disagreed that they experienced a significant learning curve. Lastly, those who appeared to be in the midst of a paradigm shift indicated neutrality on both issues. The reasons for these differences were likely associated with a number of the following factors.

Key factors affecting scaffolding and learning curves.

The discussion of key emergent technology integration factors most likely associated with paradigmatic differences in respondents' perceived level of scaffolding needs and amount of learning curve experienced during the term is divided into three topic areas. The first connects scaffolding and learning curve results to key factors previously discussed in Question 2. This is followed by discourse on the relationship between scaffolding and learning curve results and the pursuit of personal technology integration goals during the term. The final association considered is between any changes in thinking about the key factors that most empower learners to integrate emergent technologies for learning on demand and respondents' perceived need for scaffolding and learning curve during the term.

Key empowerment factors.

Characteristic of the learners' behavioural mindset discussed in Chapter 2, P group respondents' top technology integration factors illustrated the profound lack of control that they felt they had over the integration of emergent technologies. As discussed in the second part of Question 2 above, four out of the top five empowerment factors identified by the P group were disempowering; no other top five factor group list included a disempowering factor. First on the P list were feelings of disempowerment caused by the lack of government changes. The primacy of the government lack of change factor, as well as the inclusion of the lack of empowerment factors related to the institution and workplace were indicative of the behavioural top-down management approach to learning reviewed in Chapter 2. As one respondent said, "The technological tool used to [deliver the curriculum] is often irrelevant because it is often prescribed by the school boards. You are very restricted and limited in what you are allowed to use." This respondent also exemplified the passive role of a pedagogical student. When asked at the beginning of the term if this respondent had set a personal technology integration goal for the course, the reply was, "No… this isn't a technology course." However, the respondent did expect to learn to integrate emergent technologies in other courses that focused upon this topic. Lastly, the P group was the only group to exclude self-responsibility for learning in their top five factors list. Examination of P group responses to the question about who held the greatest responsibility for such learning showed that this group felt the government was primarily responsible. Therefore, one possible explanation for why the P group strongly disagreed that they required more scaffolding than others in their course, or that they had experienced a significant learning curve during the term in relation to the integration of emergent technologies is because they did not engage in this type of learning during the term since they expected the government, workplace, institution, program, and course to direct this learning process.

Considering that the H group experienced a sharp increase from the practicing to competency level of mastery with the 16 emergent technologies identified in the study, it seemed inexplicable that the H group strongly disagreed that they required more scaffolding than other learners, and disagreed that they experienced a significant learning curve during the term. Nonetheless, the top five empowering factors on the H list offered some possible explanations. There was a steady decrease of up to five percent of empowerment units between factors on other groups' top five factor lists except the H list. The fourth factor on the H list was only 2.3% lower than its top factor, suggesting that the instructional use of assignments, being responsible for their own learning, the instructional use of technologies, and the role of the instructor in the instructional process were almost equally empowering to this group of learners. Review of H group interviews suggested that these participants typically initiated contact with the instructor to design assignments that enabled these learners to merge personal technology integration aims with end products that could be used in their PLEs. As one H respondent explains:

> It puts learning more into your own hands so that you can actually tailor assignments for your strengths and weaknesses. So that's one of the nice things is being able to (and of course, not all students are going to do this), but being able to

> actually say, "OK, I want to learn more about using, let's say, NFC technology. So I am going to ask my professor if I can do a hands-on assignment where I am actually using Frequency Chips. That is really one of the biggest things.

These H group members, however, did not usually rely upon course activities, content, or the instructor to facilitate the technology integration learning process. One H respondent said, "It helps me take charge of my own learning when it is me guiding my own learning, not the teacher. So I have to make sure that I am motivated and have the self-efficacy to take care of my own education." In fact, H respondents such as this one often described themselves as being insatiable emergent technology learners, who tended to take on emergent technology integration leadership roles in workplace and PLE settings. As this same respondent explained, "In my case it is that I am the tech lead in my school. So everybody looks to me for what's new, how can we use this, etcetera… And at home, I'm a giant nerd, so I just like to know things."

The seeming incompatibility between the significant increase in the mastery level of emergent technology integration among H group members, their perceived lack of scaffolding need, and less than significant learning curve experienced during the course could be explained as a blend of two factors: these respondents were self-determined learners and emergent technology integration leaders. They had an established network of supportive human and non-human resources that extended well beyond the class setting and were also motivated to seek out new resources as needed. Thus, to such learners, any scaffolding or significant learning curve might not be viewed as a result of their class experience.

The third seemingly confounding relationship was between the shifting paradigms group's slight increase in the practice level of mastery with emergent technology integration, disagreement that they required more scaffolding than other classmates, and the neutral response to the statement that these learners experienced a significant learning curve over the term in relation to emergent technology integration. Turning again to the top five empowering emergent technology integration factors, some possible explanations were identified. While the top three factors on the shifting paradigm group's top five factors list were also the top three factors on the H list, the order of priority among these factors and the percent of units per factor on these lists were different. Secondly, the final two encouraging factors on the shifting paradigms list were workplace currency and Pro-D, and the MEd DE curriculum, which shared fourth and fifth place on the shifting paradigms list. These findings could indicate that members of the shifting paradigm group struggled with taking ownership over their own learning. For instance, the uneven distribution of units on the shifting paradigms list might have suggested that these learners had not fully grasped the power that these factors had in helping them to realize personal emergent technology integration goals. A second clue as to the shifting paradigm group's transitory state was the inclusion of curricular factors that might empower these learners, suggesting remnants of the passive learners' behavioural mindset about the incorporation of emergent technologies into their daily lives being somewhat beyond their control. This possibility was illustrated by the following shifting paradigm respondent's comment, "I haven't had any courses where they actually require the use of a mobile technology. I believe that would be very helpful because it would force you into using something that you may avoid."

The relationship between the slight increase in the shifting paradigm group's technology integration mastery scores and disagreement with the need for greater scaffolding than their classmates might suggest that some members of the shifting paradigms group required a bit more scaffolding because they were learning how to adopt a more self-determined role in relation to personal technology integration course goals. The neutral response to the significant learning curve statement further supports the idea that shifting paradigm group members may have struggled, to varying degrees, with emergent technology integration empowerment issues that could well have prompted a transformative learning curve, while barely affecting their level of technology integration mastery during the term.

Greater insight into the relationship between paradigms, technology integration mastery levels, scaffolding, and learning curve results was gained when these results were compared to which respondents set and changed personal technology integration goals during the term.

Setting and changing integration goals.

The fact that none of the P group set a personal emergent technology integration goal for the term offered further explanation as to why the mastery level of emergent technology integration among this group had moderately declined over the term. This also explained why these respondents did not require greater scaffolding than their classmates and did not experience a significant learning curve in relation to emergent technology integration during the term.

While all H group members did set emergent technology integration goals for the term, they did not require greater scaffolding than their peers or experience a significant learning curve. This lack of scaffolding or significant learning curve was most likely due to the self-determined nature of these learners, as outlined in the key empowerment factors sub-section above.

Almost half of the shifting paradigms group did not set a personal emergent technology integration goal. Those who did not set a goal strongly disagreed that they required more technology integration scaffolding than their peers, and disagreed that they experienced a significant learning curve during the term. The average scaffolding and learning curve responses were neutral among those who did set a personal technology goal. Sixty percent of those who did set a goal reported that they changed it, either as a result of completing one of the assignments, or as a consequence of other aspects of the course experience. Those who changed their goals agreed that they required more scaffolding than their classmates and that they had experienced a significant learning curve during the term. The results related to the shifting paradigm group members who did set and possibly change their personal emergent technology integration goal strengthens the supposition from the last sub-section that, to varying degrees, these respondents might have been experiencing some conceptual changes in thinking about the empowering role of emergent technologies in learning, while not experiencing much growth in the mastery of technology integration with the 16 emergent technologies identified in this study. To this end, results related to changes in thinking about emergent technology integration among participants were explored next.

Change in thinking.

Three quarters of study respondents said that their ideas about the key factors that most empowered other learners and them to integrate emergent technologies on demand had not changed as a result of having completed the course. No respondents who had consistently preferred a P or H learning environment throughout the term reported a change in thinking. This could have been another reason for why these respondents strongly disagreed that they needed more scaffolding than their classmates, nor had experienced a significant learning curve during the term.

Sixty percent of participants whose learning environment preferences appeared to shift during the term said that their thinking about the key factors that most empowered other learners and them to integrate emergent technologies for learning on demand had not changed over the term. This could have also contributed to their perceived lack of need for scaffolding and less than significant learning curve experience during the term.

On average, those in the shifting paradigms group who reported having a change in thinking about this topic expressed neutrality about their need for scaffolding or about experiencing a significant learning curve during the term. However, the variance in responses about perceived need for scaffolding and learning curve experienced among those who had reported a change in thinking ranged from disagree to strongly agree. The relationship between these respondents' perceived change in thinking, and scaffolding and learning curve results lends further support to the premise that these learners might have been experiencing, to varying degrees, conceptual transformation about the key factors that empowered other learners and them to integrate emergent technologies.

Summary.

In reply to the first part of Question 3, generally-speaking respondents who consistently preferred a behavioral or perceptual paradigm strongly disagreed that they required more scaffolding than their classmates, while those who were likely experiencing a paradigm shift disagreed with this statement. Furthermore, those who preferred a behavioural paradigm strongly disagreed that they had experienced a significant learning curve during the term, those who adhered to the perceptual paradigm disagreed, and those in the shifting paradigm group expressed neutrality with this statement.

Three types of data were employed to answer the second part of Question 3. These included the five key respondent-identified factors that empower emergent technology integration, respondents' personal emergent technology goals, and changes in thinking about the key factors that most empower learners to integrate emergent technologies for learning on demand.

Respondents indicating a consistent preference for the behavioral paradigm throughout the course did not set a personal emergent technology goal for the term. Neither did they report a change in thinking about the key factors that most empowered learners to integrate emergent technologies. Furthermore, examination of the top five empowerment factors identified by this group suggested that these respondents felt greatly disempowered to integrate emergent technologies into their daily lives. They identified the government as having the greatest responsibility in promoting emergent technology integration, and expected the government, institution, and program to disseminate this kind of learning to them. The reason why they did not contemplate setting an emergent technology integration goal for the term was because they did not view this as part of the sanctioned course objectives or outcomes. Collectively, these factors most likely explained why this group of respondents strongly disagreed that they required more scaffolding than other learners, nor experienced a significant learning curve during the term.

Examination of the key factors that empowered those who preferred a perceptual paradigm throughout the term to integrate emergent technologies provided some possible explanation as to why this group's thinking had not changed, their need for scaffolding was minimal, and they had not experienced much of a learning curve even though they had set and achieved a personal emergent technology integration goal. Exploration of these factors resulted in the discovery that these respondents were self-determined learners who initiated contact with the instructor in order to design assignments to attain personal emergent technology goals. While they recognized, valued, and harnessed the empowering factors in the class setting, these self-determined learners relied primarily upon themselves to set goals, access PLE resources to achieve these goals, and evaluate their own learning in relation to these goals. These factors likely explained the lack of change in thinking, minimal need for scaffolding, and slight learning curve reported by these learners in relation to their class experience during the term.

Overall, three quarters of shifting paradigm group members who did not set a personal technology integration goal reported not having a change in thinking. These respondents strongly disagreed that they required more scaffolding than others in the class, and disagreed that they had gone through a significant learning curve during the term. Those who set a goal but didn't change it did not respond to the scaffolding statement, were neutral about the learning curve statement, and reported no change in thinking. However, 75% of those who had set and changed their goal during the term also underwent a change in thinking during the term. This latter group agreed that they had required more scaffolding than their classmates and had experienced a significant learning curve during the course.

Review of the most empowering technology integration factors identified by the shifting paradigms group offered further explanation for the variance in scaffolding and learning curve results between shifting paradigm group members who did not set, set, or set and changed personal emergent technology integration goals during the term. While the key empowering factors list indicated that those belonging to this group recognized how empowering being responsible for their own learning was, the shifting group also looked to the curriculum and their employer to empower them. This reliance upon meso-level authorities reflected some adherence to the behavioural paradigm. Another clue that members of the shifting paradigm group were struggling with becoming responsible for their own learning was the mid-list placement of the instructional use of assignments. This placement, as well as previously mentioned factors likely reflected the fact that most of these respondents stated that they did not have a personal emergent technology integration goal when asked this question early in the term, yet approximately half of them subsequently set such a goal and also reported experiencing changes in thinking during the term. These events may have contributed to the variation among shifting paradigm participants' perceived need for scaffolding and learning curve experience responses, and may also explain why these respondents did not consistently adhere to a particular paradigm.

Most Empowering Paradigm

The central question investigated in this study was, "What educational paradigm most empowers online graduate level learners to acquire higher levels of emergent technology integration for learning on demand?" Results from quantitative and qualitative data gathered from the volunteer respondents throughout the term were used to answer this question. The response to this question is premised by a description of the paradigmatic elements identified in the two class settings included in the study.

Class settings.

Discussion with the two course instructors and review of the public course web pages indicated that the two class settings and various course elements were very similar. Both courses contained pedagogical and technical elements that merged theory and research findings with assignments and activities designed to help students practically apply what was learned. The instructors offered a wide variety of assignment choices, including the option to design personally-relevant assignments with the instructors. Any activity or assignment timelines within the instructors' control were extremely flexible and negotiable. Both courses provided learners with the opportunity to grade themselves or others for some assignments or class participation. Yet some course elements were beyond the instructors' decision-making powers. The instructors could not significantly alter the module-based course design, course syllabus, content, assignment expectations, grading system, or overall course timeline without pre-course delivery approval by department faculty, the institution, and/or the government. Thus, it was concluded that any choices made at the instructor level allowed learners to pursue learning in a fairly self-directed, if not self-determined manner, whereas overall classroom management and course delivery were driven by the behavioural paradigm. With these class setting profiles in mind, attention now turns to a discussion on the paradigm that most empowered the learners in this study to integrate emergent technologies for learning on demand during the term.

Respondents' most empowering paradigm.

Individual respondent results were aggregated into respondent groups representing those whose learning environment preferences had not changed throughout the course and those whose preferences had appeared to shift during this timeframe. The results of this process indicated that three-quarters of the respondents altered their paradigmatic preferences over the term. Among those who altered their preferences, two thirds increased their preference for an H environment, while the remaining third migrated closer to the P environment. One third of respondents maintained a consistent preference for a particular paradigm throughout the term. Two-thirds of these preferred an H environment, while the other third preferred a P environment.

Deeper investigation into data results gathered in relation to various sections of the omni-tech taxonomy showed fluctuations in various innate drives, even among those respondents who had maintained a consistent preference for one paradigm throughout the term. This suggested that respondent perceptions were not static, which supports the view that learning does not develop in a linear fashion but is, indeed, dynamic and complex (Garnett & O'Beirne, 2013; Hase & Kenyon, 2013).

P, H, and shifting paradigm respondents' emergent technology integration mastery levels were all at the early practice level when the term began. P and shifting paradigm mastery levels remained at the early practice level by the end of the term, while the H level increased to the competency level.

Perhaps the technology mastery level in the P group did not improve by the end of the term because this group did not set personal emergent technology goals for the term. Possible reasons for not setting goals were found by investigating the top five empowerment factors identified by this group. This led to two discoveries. First, this group felt profoundly disempowered by government, institution, curricular, and workplace factors. This sense of disempowerment was so pervasive that unless mandated course objectives and outcomes focused upon learning how to use new technological tools, these passive respondents believed that this sort of learning could not be part of the course. Second, this group of learners felt that the primary responsibility for teaching them how to integrate emergent technologies came from the government. Being responsible for their own learning was not a key empowerment factor for these learners. Therefore, the ability to acquire higher levels of mastery among P group members would not be expected, given that these respondents did not set an emergent technology integration goal and felt so disempowered that they failed to recognize the opportunities provided in the course to do so. It also explained why these respondents strongly disagreed that they required more emergent technology integration scaffolding, nor experienced a significant learning curve or change in thinking related to this area of learning during the term.

Exploration of the key factors that H group members felt most empowered learners to integrate emergent technologies offered possible reasons for why the H group set goals and achieved the highest level of technology integration mastery among respondents in the study, but did not require significant scaffolding, or experience a great learning curve or change in thinking during the term. The top four of the five key empowering emergent technology integration factors identified by the H group included being responsible for their own learning and the instructional roles of assignments, the instructor, and use of technology. Review of interview conversations coded within these factor areas indicated that H group members tended to be emergent technology integration leaders at work, had formed expansive workplace and social networks with peers sharing the same goals and interests, and enjoyed exploring new technologies at home on their own time. Furthermore, the inclusion of the empowering role that these respondents' own students had in helping the respondents to integrate emergent technologies on the most empowering factors list supported the evidence that these respondents were learning leaders who not only felt responsible for their own learning, but others' learning as well. These H learners initiated contact with the course instructor in order to design assignments that would further these learners' personal and professional emergent technology goals while meeting course objectives. Thus, a possible reason why these learners did not require more scaffolding than classmates or experience a notable learning curve as a result of completing the course was because these H group members relied more heavily upon resources and experiences outside of the classroom setting to help them achieve their goals. It was also likely that the H group members did not experience a change in thinking because the processes and resources that these H group respondents employed during this timeframe were assisting them in successfully mastering the integration of these technologies as they desired, as evidenced by the competency level of technology integration mastery achieved by this group by the end of the term.

As a collective, the shifting paradigms group reported a slight increase in their practice level in technology integration mastery by the end of the course. Almost half of this group did not set a personal goal and over half had not experienced change in thinking over the term. Yet, while the P and H groups strongly disagreed that they needed more scaffolding, the shifting group only disagreed with this statement. Furthermore, the P group strongly disagreed and the H group disagreed, whereas the shifting paradigms group expressed neutrality that they had experienced a learning curve during the term.

Three quarters of the shifting paradigm group members who had not set a personal emergent technology integration goal for the term reported no change in thinking over the term. It therefore seems logical that they strongly disagreed with the scaffolding statement and disagreed with the learning curve statement. There was also no change in thinking among the shifting paradigm group members who did set a goal, but never changed it as the term unfolded. These group members did not respond to the scaffolding statement and disagreed with the learning curve statement. The results from the learning curve statement indicated a slight increase in learning curve as opposed to the shifting paradigm group members who did not set a goal. Four out of five shifting paradigm respondents who set and modified their personal emergent technology integration goal during the term reported a change in thinking. This last group also agreed that they required more scaffolding, and experienced a significant learning curve during the term.

Examination of the key factors identified by the shifting paradigm group led to the conclusion that many members of the shifting paradigms group may have been struggling with who should retain control over their learning in relation to emergent technology integration. Over one third of this group expressed greater kinship with the behavioural paradigm by the end of the term, while the other two-thirds strengthened their preference for a perceptual one. Perhaps this explained why this group's list of key factors had much more in common with the H group's list than with the P group's list. Yet the inclusion of the MEd DE program curriculum on the list suggested that the shifting paradigm group still relied upon the curriculum to empower them to integrate emergent technologies, indicating that at least a few members retained some adherence to a behavioural mindset. Finally, some group members may have also been learning how to take greater control over their own learning. Evidence for this hypothesis was drawn from the fact that the empowering role of instructional assignments was placed lower on the shifting paradigms list than on the H list. This might have suggested that while some of these learners recognized the empowering nature of assignments, they were struggling with how best to leverage this factor to attain their goals. All in all, this eclectic collection of factors and the placement of these factors on the shifting paradigms list reflected the transitional nature of this group as they adopted more behavioural or more perceptual mindsets towards integrating emergent technologies as the term unfolded. Moreover, this list likely reflected how the decision to not set a personal emergent technology goal, to set a consistent goal throughout the term, or to change that goal as the term progressed affected these learners' need for scaffolding, their learning curve, and most critically, how this decision correlated to their change in thinking about key empowerment factors during the term.

Summary

Responses to one overarching research question and three sub-questions were explored in this chapter. Qualitative interview data was used to answer the first sub-question, Question 1, which sought to determine what key institutional, curricular, instructional, and contextual factors most empowered the learners in this study to integrate emergent technologies for learning on demand. The second part of Question 1 considered if respondent's selection of key factors would change as the term progressed.

The ten mid- and post- term themes containing the most units from within factor categories and across categories were used to answer the first part of Question 1 (Figure 27). This list included 30% of all coded units and 40% of all encouraging units. Two thematic factors represented almost half of the empowering units found on the list. Of these two, the most empowering emergent technology integration thematic factor was the use of emergent technologies in online instructional and PLE settings, which represented one third of all units on the top ten list. The second most prevalent theme was being responsible for one's own learning, which included being self-motivated and teaching oneself. The need for all stakeholders to make emergent technology integration learning relevant was the third most-discussed empowering thematic factor. The instructional use of assignments and, to a somewhat lesser extent, activities were next on the list; these two thematic factors portrayed one quarter of the most empowering thematic factors list. The remaining thematic factors represented less than 10% of the list.

A list of the ten least empowering factors were also determined by selecting merged mid- and post-themes that contained the most units from among all categories. This list represented eight percent of all empowerment units and almost half of all lack of empowerment units coded in the study. Examination of this list indicated that the instructional use of technology was the most disempowering thematic factor. Units coded to this factor constituted nearly one quarter of all lack of empowerment factors on the top ten list. Second on the least empowering factors list was formal schooling, which represented less than one-fifth of the units on this list. The remaining factors constituted 10% and less of the lack of empowerment top ten list.

Overall, it was the use of emergent technologies in instructional and workplace settings that most empowered and disempowered respondents to integrate these technologies for learning on demand. The deepest, most thorough understanding of emergent technology integration was derived when respondents were able to merge theoretical conceptions and research findings with relevant practical application of emergent technologies.

The second part of Question 1 sought to determine if respondents' perceptions of what factors were most salient would change over time. The response to this question was yes, to varying degrees. Overall, the percentage of units on the top ten encouraging factors list increased slightly from mid- to post-term. Six factors were common to both lists, although the number of units were unique to each list, resulting in a change in ranking on the post-term list for five of these factors. The instructional use of technology had risen from second place (15% of mid-term units) on the mid-term top ten list to first (26% of post-term units) on the post-term list. The number of top ten factor units for the being responsible for one's own learning factor dropped three percent over the term, thus moving it from first to second place by the end of the term. The number of units for the encouraging use of instructional assignments remained almost stable, and therefore enabled this factor to retain a steady third place position on the mid- and post-term lists. The encouraging instructional roles of the instructor and learners factors moved from ninth and tenth positions on the mid-term list to fourth and fifth on the post-term list, respectively. Finally, encouraging curricular changes to the MEd DE program moved from fifth place on the mid-term list to seventh on the post-term list. Beyond these similarities, no seemingly identifiable patterns or trends were obvious when the results used to answer this question were considered in isolation.

The remaining part of this section merges responses to Question 2 and 3 with discourse on the over-arching question posed in this study in order to provide a succinct picture of these inter-dependent findings. The overarching question sought to determine what educational paradigm most empowered online graduate level learners to acquire higher levels of emergent technology integration for learning on demand. In brief, a perceptual or learner-determined paradigm most empowered study respondents to acquire higher levels of technology integration. An in-depth response to this question follows.

Results indicated that three-quarters of all respondents' learning paradigm preferences changed during the term. Some of these respondents had increased their preference for a behavioural paradigm; others increased their preference for a perceptual paradigm. Among those whose preferences did not change, one-third preferred a behavioural paradigm, while the other two-thirds preferred a perceptual paradigm. Yet, in using the omni-tech taxonomy to more deeply explore individual respondent profiles, it was noticed that even among those whose paradigm preferences did not change during the term, the level of adherence to a particular paradigm fluctuated (Chapter 5, Figure 21). These findings supported assertions by Hase and Keynon (2013) and Garnett and O'Beirne (2013) that learning did not progress in a linear manner along a PAH continuum, but instead was messy, non-linear, and dynamic in nature.

Despite these fluctuations within individuals' behavioural, perceptual, or shifting paradigm preferences, certain patterns emerged. To illustrate, those who adhered to the perceptual paradigm during this study described themselves as people who were empowered by being responsible for their own learning. They were emergent technology integration learning leaders within work, social, and personal settings. They set, assessed, and achieved personal emergent technology goals with the support of an expansive PLN, yet also enjoyed tackling learning challenges using personal trial and error techniques. They did not rely upon the course instructor, other human and non-human resources, assignments, or activities in the class setting, but viewed these resources and events as factors that further empowered them to achieve personal emergent technology goals. Finally, these self-determined learners were also empowered by being responsible for others' learning as well. Such factors explain why these learners set and achieved personal emergent technology goals and improved their emergent technology integration skills from the practice to competency level by the end of the term. It also explains why they did not require much scaffolding, nor experience a significant learning curve or change in thinking as a result of exposure to the course. Their life-wide, self-determined approach to learning was helping them to successfully achieve their goals.

In direct contract, those whose learning preferences aligned with a behavioural paradigm felt mostly disempowered to integrate emergent technologies. Although both courses and research instruments included conceptual and systemic emergent technologies, and all research instruments provided a definition of emergent technologies that included these notions, these respondents overlooked such technologies in the delivery of their course. To these learners, the course was not about learning how to use a technological *tool*. If course activities, assignments, or the instructor did not overtly sanction such learning, these passive learners would never contemplate setting a personal technology goal. The sense of disempowerment was profound among these learners. Four out of the top five empowerment factors identified by this group were disempowering. The more removed a stakeholder was from these respondents' learning environment, the more responsibility these learners perceived that stakeholder to have in teaching them how to integrate emergent technologies. This explained why these learners did not set a personal technology goal, experienced no change in thinking, felt that they required no scaffolding, and experienced no learning curve during the term in relation to the integration of emergent technologies. It also explained why their level of mastery with these technologies did not improve.

Those whose paradigm preferences appeared to shift during the term were empowered to varying degrees. Those who did not set personal emergent technology goals for the term did not experience a learning curve or change in thinking, require scaffolding, or improve their level of mastery with emergent technologies during the term. Those who set a goal, but did not change it required very little scaffolding, experienced a slight learning curve, and reported no change in thinking over the term. As a result, their level of technology integration increased negligibly by the end of the term. On the other hand, most of those who had set and changed their goal during the term agreed that they required more scaffolding, as well as experienced a significant learning curve and change in thinking. While their mastery of technology integration still remained at the practice level by the end of the term, this latter group's level of practice was higher than those who did not set a goal, or did not change their goal. Thus, it was concluded that those who were self-empowered enough to set a personal emergent technology goal, assess it, and change it, also improved their emergent technology integration levels.

The final conclusion of this discussion chapter is that self-determined learners are most empowered to acquire higher levels of emergent technology integration for learning on demand.

The following concluding chapter synthesizes the research project.

Chapter VII: CONCLUSIONS

Chapter 6 discusses the exploratory transformative mixed methods data results from Chapter 5 within the context of the questions raised in this study. Using a critical pragmatic lens, Chapter 7 begins by presenting conclusive answers to these questions and discussing the value of the paradigm shift framework. Next, Chapter 7 considers recommendations for future study, and then reviews the limitations and significance of the study before providing final comments.

Three key factors were identified by respondents as being most empowering to learners in integrating emergent technologies for learning on demand. These factors represented nearly three-quarters of all factors on the top ten list of encouraging factors throughout the term. The most prevalent factor was the use of emergent technologies in online school, workplace, and PLE settings, which possessed two-fifths of all encouraging units on the top ten list. It was concluded that learners in this study needed to use emergent technologies in school in order to more deeply understand and employ these technologies in ways that were meaningful to them.

The second most discussed encouraging factor was being responsible for one's own learning. Lower on the top ten list were also the related sub-topics of self-motivation and teaching oneself to learn. These three factors included nearly one-third of the units on the top ten encouraging factors list.

The factor containing the third greatest number of encouraging units was relevancy. The cross-category nature of this factor indicated that study participants felt that all stakeholders should endeavour to integrate emergent technologies in a relevant manner. Numerous respondents reported great satisfaction when they were able to integrate personally and professionally relevant emergent technology goals with course assignments. Helping learners integrate emergent technologies in a manner that is relevant to many facets of their lives is a strategy with which many scholars concur. For example, one of the key topics identified when Palalas, Wark, and Pawluk (2017) merged a systemic review of 85 multimedia resources on mobile learning and adult literacy with interviews and focus group discussions among mobile learning and literacy experts was the need to make learning relevant to learners. Subsequent phases of research on the same project further underscored the importance of relevancy in the learning process (Palalas & Wark, 2017). Thus it was concluded that the relevant integration of emergent technologies was as valued by respondents in this dissertation project as it was by other educational stakeholders in the academic community.

Lack of empowerment units represented less than 10% of all empowerment units for both courses throughout the term. Almost half of all identified lack of empowerment units were included in the cumulative list of the ten most disempowering emergent technology integration factors. Half of the units included in this top ten list were associated with three key factors. One quarter of the units on the list were coded to the instructional use of technologies. Most interview discussions relating to this factor included perceptions that the institution, curriculum, courses, and instructors inadequately facilitated access to and timely, relevant integration of emergent technologies for learning on demand. To illustrate this point, one respondent reflected upon a course that focused on the use of an e-portfolio app that was outdated. She suggested that instead of focusing on the use of specific apps that would soon become obsolete, instructors should have helped learners recognize the more global features of most e-portfolio apps that would enable learners to then select the app that worked best for them. This suggestion underscored why helping students to learn how to perceive technological patterns makes sense in this fluxing world of ever-emerging technologies, as discussed in the perceptual learning section of Chapter 2. Other respondents said that it was exceedingly difficult to gain deep understanding of an emergent technology in courses that provided theoretical and research-based presentation of such technologies, but neglected to offer opportunities to implement this learning in a hands-on manner. Such reflections highlighted the importance of integrating theory with practice to achieve learning mastery, and reiterated the need to make learning relevant to learners.

Nearly one fifth of the units on the top ten lack of empowerment factors list were related to formal face-to-face and online schooling. Most formal schooling conversations focused upon the lack of access to emergent technologies, as well as the lack of currency and relevancy of instructional human and non-human resources. To illustrate, some respondents pointed out that most assignment products reflected the structural and functional format of assignments given in the past two centuries. Such assignments disallowed the integration of emergent technologies or multimedia. Others observed that many instructors demonstrated less competency with various emergent technologies than most students did. It was concluded that respondents perceived a need by formal institutional stakeholders and instructors to become more conversant in emergent technology integration.

The third highest factor identified by respondents on the top ten lack of empowerment list contained one tenth of the units on the list. This factor was the MEd DE curriculum. As with first two disempowering factors, most respondent discussions about the program curriculum dwelt upon the lack of currency and relevancy of human and non-human instructional resources, assignments, and emergent technologies. Thus, the overall conclusion reached upon review of these key factors was that respondents perceived the need for educational stakeholders to keep pace with current technological trends, help learners gain access to these technologies, and to provide current resources, as well as practical, relevant opportunities for learners to integrate emergent technologies.

Consistencies and variances were noted when lists of the top ten empowering mid- and post-term factors were compared. First, the number of encouraging factors on the top ten lists increased slightly from mid- to post-term. While six of the ten factors were found on both lists, the number of units varied and the order of five of these factors on the lists also changed. Second, the instructional use of technology rose from second place top of the list, while being responsible for one's own learning dropped from first to second place by the end of the term. Third, while the encouraging role of instructional assignments remained in third place on both lists, the encouraging roles of the instructor and learners rose from ninth and tenth place on the mid-term list to fourth and fifth place on the post-term list. Lastly, it was noted that the higher a factor was on either list, the more likely it was to be on both lists.

One tentative conclusion drawn from these results was that the study possibly heightened respondents' awareness of their use of technologies which, in turn, increased their discussions on this empowering factor. Related to this conclusion was the possibility that in asking who should be most responsible for helping them to learn how to integrate emergent technologies and if they had set a personal emergent technology goal for the term, respondents became more convinced that they controlled their own learning by the end of the term. Other possibilities for the post-term rankings for use of technology and being responsible for their own learning factors included the learner-centric and learner-determined instructional approaches found in both course settings. Lastly, it was concluded that the most likely reason why the selection, placement, and number of units related to each factor on the top ten lists varied was because learning is messy (Garnett & O'Beirne, 2013). Three-quarters of respondents appeared to be in the midst of a paradigm shift during the term. Although the remaining third indicated a consistent preference for one paradigm, the degree to which they appeared to adhere to that paradigm preference changed dynamically over the term.

The central question in this study sought to determine what educational paradigm most empowered the online graduate level learners in this study to acquire higher levels of emergent technology integration. All respondents in the study indicated that they were near the beginning of the practice level of mastery with emergent technologies when the term began. Respondents who expressed a constant preference for a behavioural paradigm throughout the term reported a slight decrease in their skill level by the end of the term. These respondents exemplified the passive, dependent learner profile engendered by the behavioural paradigm and educational system detailed in Chapter 2. They did not set emergent technology integration goals because they perceived that the course they were enrolled in did not direct them to do so. Review of the three lists of key empowerment factors identified by each group underscored how disempowered the behavioural paradigm group felt. This group's list of key factors was the only list that identified disempowering factors. Four out of the top five factors on this list were disempowering.

Those whose paradigm preferences appeared to shift during the term collectively reported a negligible increase in their emergent technology integration skill level as well. However, when the shifting paradigms group was sub-divided into those who did not set a personal emergent technology goal, those who set a goal but did not change it, and those who set and changed their goal, it was discovered that those who set and changed their goal did experience a fair increase in skill, although they remained at the practice level at the end of the term. Perusal of the five key factors identified by the shifting paradigm group indicated significant alignment with the perceptual paradigm group's list, but also some adherence to a behavioural paradigm. Therefore, members of the shifting paradigm group appeared to be, to varying degrees, struggling with control over their own learning. Those in the shifting paradigm group who set and changed goals were the ones who typically experienced a change in thinking about key empowerment factors. They were also the ones whose level of practice with emergent technologies increased the most among those in the shifting paradigms group.

Nevertheless, it was those who consistently adhered to the perceptual paradigm group throughout the term who acquired the most significant level of emergent technology integration by the end of the term. This latter group set emergent technology integration goals for the term and reported being at the competency level of mastery when the term ended. Review of the key empowerment factors identified by this group indicated that these learners were self-determined learning leaders who equally valued and employed four key factors in their immediate online learning environment, accessed extensive resources within their PLE, and enjoyed teaching themselves in order to achieve their goals. These respondents epitomized the intrinsically-motivated, self-determined learning leaders of the perceptual paradigm described by such scholars as Emery (1981), Hase and Kenyon (2001; 2013), Blaschke (2013), Blaschke and Hase (2016), Ryan and Deci (2000a; 2000b), and Pink (2009), as detailed in Chapter 2.

It was therefore concluded, based upon the analyses of quantitative and qualitative data gathered from the respondents' perceptions in this study, that the perceptual paradigm most empowers learners to integrate emergent technologies. Furthermore, the respondents who consistently preferred the perceptual paradigm appeared to be self-determined learning leaders who integrated emergent technology naturally within their PLEs, as defined by the transformative learning and leading category of the omni-tech taxonomy and heutagogical learning approach of the paradigm shift model.

Next, the value of the paradigm shift framework for identifying learning paradigms and increasing emergent technology integration among learners is considered.

Value of Paradigm Shift Framework

A detailed discussion about the paradigm shift framework is found in Chapter 3. As described therein, this framework (Figure 5) consists of a paradigm shift model (Figure 2) and an omni-tech taxonomy (Figures 3 & 4) that are intended to be interpreted and employed together in order to create a detailed picture of learners integrating emergent technologies within their current and desired PLEs.

While a quick picture of learners' current and preferred PLEs and related integration of emergent technologies could be derived solely through quantitative data collection and analysis, a mixed method approach, such as the one used in this study, provides verification of quantitative results, as well as a deeper, more dynamic, and contextual understanding of the relationship between paradigms and the integration of emergent technologies. To illustrate, the quantitative questionnaire asked respondents to rate their perceived level of mastery with 16 conceptual, systemic, and tool-based emergent technologies. The mean from this list was then considered to represent respondents' perceived level of mastery with emergent technologies. When exploring why members of the shifting paradigm group who had set and changed personal emergent technology goals had not improved their skill level as much as those who were in the perceptual paradigm group, it was discovered that some of this shifting paradigm sub-group had experienced a transformational change in thinking about mobile learning. They had begun their course with the notion that mobile learning meant learning with mobile devices. By the end of the term, they recognized mobile learning as a conceptual emergent technology. This helped to explain why this shifting paradigm sub-group required more scaffolding than classmates and experienced a significant learning curve during the term. By exploring the qualitative data results, it was learned that respondents might interpret "mobile learning" on the list of 16 technologies as a conceptual *or* a tool-based emergent technology and therefore rate their level of mastery with mobile learning according to their interpretation of this phrase. Thus, if the goal of a study is to deeply understand the relationship between learning paradigms and the integration of emergent technologies, it would be prudent to employ a mixed methods approach when using this framework. With this global understanding of how the framework is best employed for research purposes, attention now turns to the paradigm shift model and the omni-tech taxonomy.

The results of this study confirm that learning is not linear or hierarchal, even though the pervasive traditional educational system promotes a lineal curriculum and a hierarchal pedagogical approach to teaching children and novice learners before moving on to a more andragogical approach with adult learners, as discussed in Chapter 2. Although Knowles (1980) eventually recognized that children are as capable of being andragogical learners as adults are, he still viewed these two groups of learners as being at opposite ends of the andragogical spectrum.

Etmer and Newby (2007) also promote linear and hierarchal learning, asserting that learners move through a continuum from behaviourism to cognitivism and then constructivism as an increasingly complex level of knowledge is developed. While this may often be so (Luckin et al., 2011; Tay & Hase, 2004), the results of this dissertation suggest that this is more likely due to the lineal curriculum and hierarchal teaching approach used in a formal educational setting than to how learning occurs naturally.

The learning paradigm preferences appeared to shift during the term among three-quarters of the respondents in this study. One third of those in this shifting paradigm group increased their preference for the behavioural paradigm, while the remaining members became more aligned with the perceptual paradigm by the end of the term. A few respondents also felt that they were less able to integrate some emergent technologies at the end of the term than they were at the beginning of the term. The quote at the beginning of this chapter by the respondent who began the term thinking that mobile learning was about using mobile devices and then determined that mobile learning was a concept illustrates how a learner can think that they know a lot about something only to discover through more study that they know less than they once believed they did. Furthermore, the level of adherence to a particular paradigm by those respondents who consistently preferred one paradigm fluctuated dynamically, rather than lineally over the term. Therefore, as Garnett and O'Beirne (2013), as well as Hase and Kenyon (2013) claim, learning is not linear or hierarchal, even though a behavioural system fostering these approaches to learning has been used for centuries. On the contrary, learning is, as these scholars suggest, a messy, complex, and dynamic process.

Given this evidence, this researcher fears that presentation of any paradigm model that may appear to be lineal or hierarchal in nature would mislead scholars. Therefore, even though it is stated in Chapter 2 that the paradigm shift model is not to be interpreted as a natural learning continuum, it behoves this researcher to present a new graphic that better reflects the findings from this study. This new illustration of the paradigm shift model is found in Figure 28. The left circle in this Venn diagram represents the behavioural paradigm and pedagogical approach to learning wherein reflective thought is encouraged. The right circle illustrates the perceptual paradigm, a heutagogical approach to learning, and reflexive thinking. The intersection between these two circles indicates a shifting state between these two paradigms, an andragogical approach to learning, and critical reflective thought. As with the original version of the model, P, A, and H approaches to learning are found in all three paradigmatic states to varying degrees. This notion is graphically expressed by the differing heights and colouring of the letters in each state. The tallest, darkest letter represents the most dominant learning approach and the shortest, lighter letter is the least dominant approach in each paradigmatic state. Lastly, the level of control over learning shifts between the teacher in the behavioural realm and the learner in the perceptual realm, as indicated in this graphic.

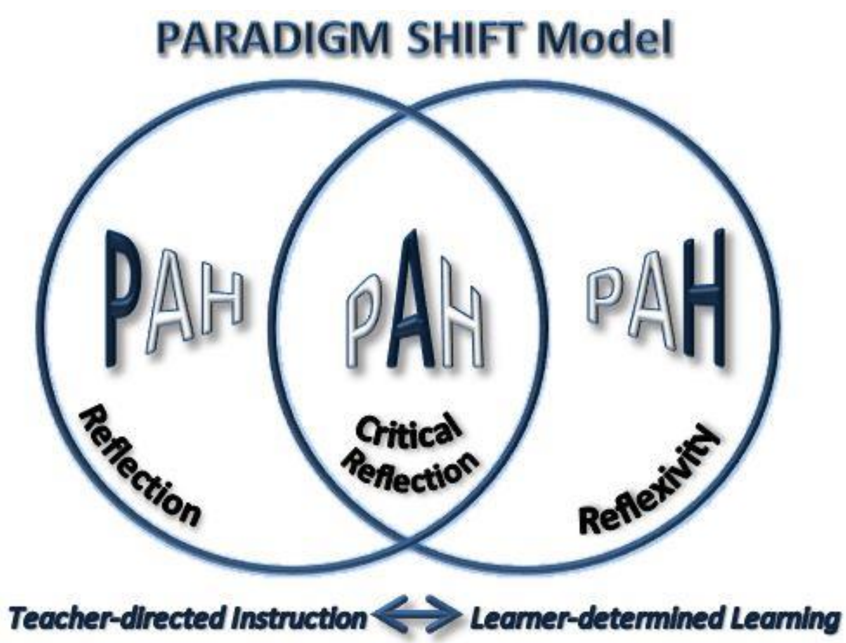


Figure 28. New paradigm shift model showing movement between teacher-directed and learner-determined approach to learning. P=a pedagogical, A=an andragogical, and H= a heutagogical approach to learning.

While it is concluded that this model helped to distinguish what paradigm respondents in this study most preferred throughout the term on an individual, class, and whole group level, the omni-tech taxonomy was indispensable in uncovering the more subtle nuances that showed just how dynamic, complex, and individualistic learning is within these paradigms. For instance, the transformative learning and leading category of the omni-tech taxonomy (Figure 4, Chapter 3) was used to measure how pedagogical or heutagogical a respondent perceived themselves to be in terms of autonomy, purpose, mastery, innovation, and reflective thought. When early term and post-term results for individual learners were compared it was noted, for example, that some of these learners' perceived level of mastery fluctuated. Review of interview data often provided explanations for such fluctuations. To illustrate, some respondents in the mobile learning course felt very competent with mobile devices when they enrolled in Course B. They perceived their level of mobile learning mastery to be very high. Yet, once they learned how complex and unique mobile learning was, they perceived their level of mobile learning mastery to be lower.

The omni-tech taxonomy accurately portrayed respondents' perceived levels of emergent technology integration in relation to the educational paradigm they aligned most closely with during the term as indicated by the paradigm shift framework (Figure 29). All respondents assessed themselves as being at early stages of practice with emergent technologies at the beginning of the term. True to their passive nature, those who aligned with the behavioural paradigm did not set a personal technology goal. Their practice level of mastery had decreased slightly by the end of the term. Those in the shifting paradigm group who did not set goals reported a negligible increase in their practice level of mastery. Shifting paradigm group members who set but did not change their goals during the term reported a slight increase in their practice level. The final members of the shifting paradigms group who set and changed their goals reported a marked increase in their skill, although they still remained at the practice level by the end of the term. Review of interview comments made by these latter members of the shifting paradigms group indicated that their knowledge and skill with some emergent technologies increased as they worked with classmates on various assignments and tasks. This provides evidence that these learners were beginning to recognize their classmates as valuable emergent technology learning resources as well, suggesting that these learners were transitioning between a behavioural and perceptual paradigmatic mindset. Finally, the respondents belonging to the perceptual paradigm increased their emergent technology integration skill level from the early stages of practice to the competency level over the term. The transformative learning and leading part of the omni-tech taxonomy also accurately portrayed these self-determined learners in relation to their paradigmatic preference. To illustrate, all of these learners set emergent technology goals during the term. They sought out their instructors in order to change assignments to achieve these goals. They employed an expansive array of human and non-human resources within their PLEs in order to pursue their goals, and found it motivating to teach themselves how to use these technologies to achieve their goals. They also identified themselves as learning leaders who helped others in work, school, and social settings to achieve personal goals as well. Being responsible for their own learning and their students' learning about these technologies encouraged them to perpetually integrate these technologies for learning on demand. This explains why these learners perceived themselves to be intrinsically motivated and strongly self-determined in terms of autonomy, purpose, mastery, innovation, and reflexive practice. It also highlights the value of the transformative learning and leading category of the omni-tech taxonomy for assessing, monitoring, and assisting people as they become more self-determined learners.

The omni-tech taxonomy was initially designed to be used for measuring learners' current level of emergent technology integration with one or more technologies in order to employ learning strategies and foster learning environments that would empower learners to adopt a more self-determined approach to perpetually integrating such technologies for learning on demand. Nevertheless, it is now believed that this same model could be used to improve learners' intrinsic motivation and self-determination in a more general, holistic sense, as well as in other specific areas of learning. These suppositions could be tested in the future.

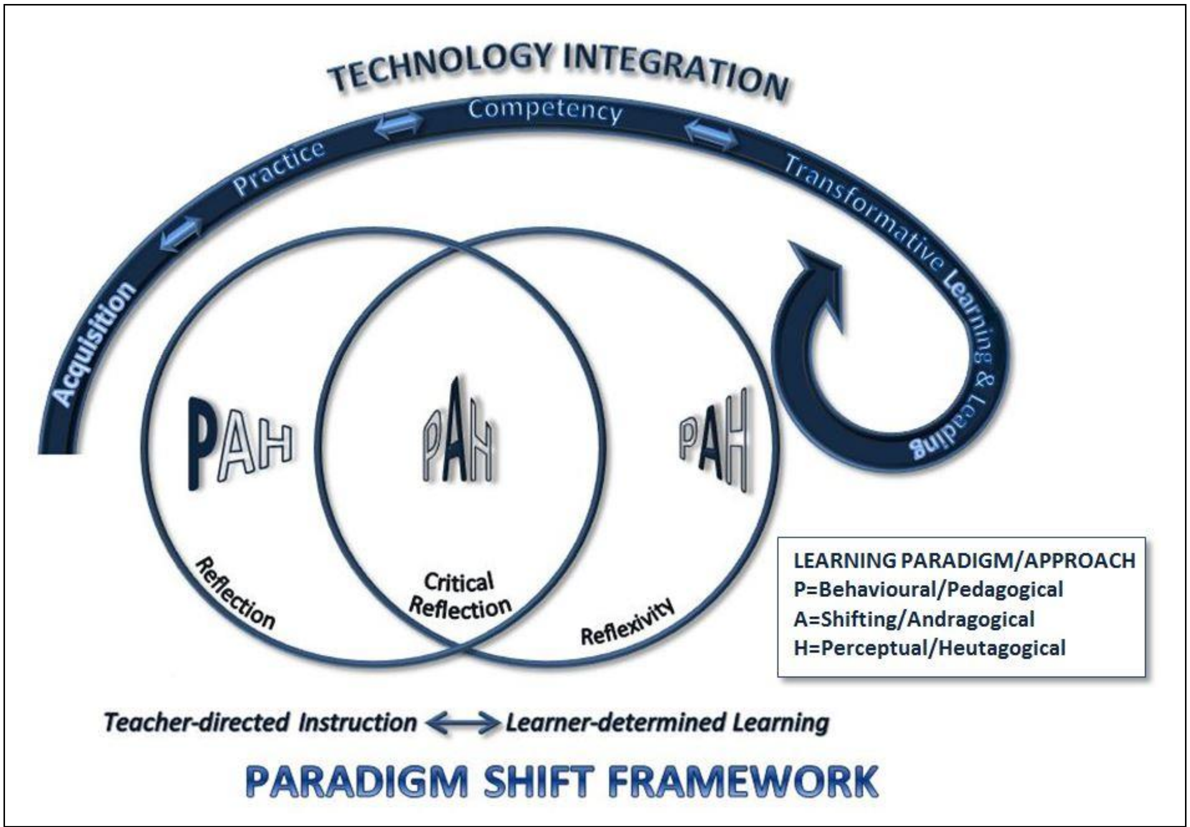


Figure 29. New Paradigm Shift Framework, illustrating the merger of the omni-tech taxonomy (dark blue technology integration arrow at the top of this image) with the paradigm shift model.

There does remain the residual fear that some academics may view the omni-tech taxonomy as promoting a lineal approach to learning. This suggests a re-structuring of the current graphic image. While it might be best to move the current acquisition, practice, and competency categories into the transformative learning and leading category to help reduce the possibility of the taxonomy being viewed as a lineal tool, it might be difficult to graphically express the resulting taxonomy and paradigm shift model as a concise framework. Therefore, arrows have been added to the taxonomy graphic in effort to convey the notion that the taxonomy identifies categorical states, rather than a linear continuum. Figure 29 offers a new graphic of the resulting paradigm shift framework, with the understanding that this new image will likely require future revisions.

In conclusion, the paradigm shift framework is useful for identifying and monitoring individual and collective paradigmatic learning environment preferences. It is also useful for cataloguing and altering learning environment attributes to promote learner mastery of emergent technologies. Finally, it is speculated that this framework may not only be useful for enhancing emergent technology integration, but also learner growth and empowerment in other areas of learning as well.

The next section considers assumptions, limitations, and delimitations of this study.

Assumptions, Limitations, and Delimitations

There were a number of assumptions, limitations, and delimitations that placed restrictions and boundaries on this study. To begin, it was assumed that educational stakeholders and readers interested in this research topic would find the dissertation topic, research undertaking, and results useful. Moreover, it was believed that by using a critical pragmatic approach to illuminate and address the problem under study, these audiences would be given a fresh view on the topic.

It was presumed that respondents would come from a diverse range of geographic backgrounds because these were online courses open to international students. While some respondents had foreign accents and indicated during interviews that they had immigrated to Canada, all respondent telephone numbers were Canadian, so all respondents were likely living in Canada at the time of the study. It was assumed that ten respondents would volunteer to participate in the study and that most of the respondents would complete all instruments that they were invited to engage with; twelve volunteer participants completed all instruments. Furthermore, it was believed that because these courses were about technology-enable teaching and learning, respondents would most likely be educators who possessed a wide range of perceptions about and experiences with using emergent technologies for teaching and learning. Eleven respondents identified themselves as educators; the other was a librarian in an educational institution. By voluntarily partaking in the study, it was assumed that respondents were interested in the topic, wanted to contribute their thoughts, and were willing to respond honestly, openly, and respectfully to the statements and questions poised through the research instruments. These latter assumptions also appeared to be correct.

It was further assumed that iterant improvements would be made to the models, concept definitions, and instruments between the pilot study beta testing, research study process, and during future use by the researcher, other educators, and scholars. Pilot study feedback led to very minor instrument changes. While other improvements are recommended based upon the study process, these are reserved for future work, as discussed in the recommendations section of this chapter.

Moving on to a discussion of study limitations, the most significant barrier was the government, institution, and faculty restrictions placed on various course elements. These restrictions prevented the course instructors from making any substantial changes to the courses. This meant that the study could not implement any instructional intervention that might expose, challenge, and possibly transform respondents' perceptions on learner empowerment and technology integration. Nonetheless, some respondents said that participation in the study had influenced their thinking about this topic.

The sample size hampered the ability of this study to produce statistically significant results or identify outliers. However, the quantitative data that was collected helped to support and verify the qualitative data that served as a foundation for this exploratory study. The use of a second coder for the qualitative and merged data analyses also assisted in ensuring the integrity of study results. It is noted, though, that scholars such as Denzin and Lincoln (1994) and Castro et al. (2010) argue that "generalizability, replication, reliability, and validity" (Castro et al., 2010, p. 343) are irrelevant in qualitative and mixed methods studies that rely mainly upon qualitative data.

The study relied upon respondents' self-perceptions as the main source of information. It sought to reflect only the voices of learners for two reasons. First, scholars such as Freire (1970/1993) asserted that only the disempowered could empower themselves. Therefore, in order to examine and possibly spark greater learner empowerment, the study necessarily focused upon learners' perceptions of power. Second, adherence to critical pragmatic research and perceptual learning paradigms supported the notion that respondents' perceptions reflected these learners' dynamic realities. For instance, at the beginning of the term some participants said that course assignments were pre-determined and unalterable. Yet the course web pages, instructors, and other participants indicated that assignments could be altered with instructor approval. As the term progressed, though, all respondents perceived that assignments could be adjusted. Thus, it was concluded that some participants had not fully understood course expectations when the course began. Since a couple respondents who initially thought that assignments could not be altered later requested adaptations to course assignments to help achieve their goals, it was determined that these early-term misperceptions did not significantly impact study results. A second example of variance in respondents' perceptions was discovered when responses to the question about changes in thinking were compared to other quantitative and qualitative data findings. In some cases, respondents reported no change in thinking, yet the other data indicated that they had experienced significant changes in thinking. The conclusion reached was that some respondents may not have had well-developed reflective skills, so it was good to have multiple data sources to rely upon.

A possible delimitation may have been the perceived power imbalance between the respondents and the researcher. However, the researcher's prior research experience using the same type of instruments with similar respondents may have helped respondents feel more comfortable. Moreover, the researcher was also a student from the same department and had completed the MEd DE program at AU, so shared many experiences and perceptions with the respondents. Lastly, the researcher did not join or participate in either study course; this may have further reduced any perceived power imbalance.

The subjective nature of this researcher and normative project are acknowledged. As in keeping with the critical pragmatic approach, this researcher overtly expressed personal biases throughout the study, intentionally seeking to challenge the mindset of educational stakeholders who may be habituated to accept and perpetuate the behavioural paradigm without question. A goal of critical pragmatic and transformative research is to transform stakeholder perceptions. Despite the inability to implement course interventions that might challenge perceptions, there is evidence that existing course elements and the study did test, and in a few cases, transform participant perceptions about learner empowerment. Follow-up research is needed to determine the extent of such changes in thinking.

The sample population was small for two reasons. First, the study was exploratory; it was testing a new framework and new instruments, so a small group was desirable. Second, there were only two MEd DE courses offered during the Spring 2017 term that included emergent technology integration instructional components.

Two instrument shortcomings were noted. First, analysis of interviews indicated that many respondents perceived emergent technology as tools. Yet the study definition for the term, emergent technology, was included on all instruments. The researcher read this definition (provided on interview scripts sent to respondents) and asked if respondents had any questions about this definition before each interview began. An in-depth post-term interview discussion with one respondent highlighted his struggle to understand this term as defined in the study. It was assumed that the inclusion of conceptual and systemic technologies on the emergent technology list that immediately followed the definition on the pre- and post-term questionnaires would provide respondents with examples of such technologies. The misalignment between some respondents' and the dissertation conception of the term likely affected these participants' responses to some questions. For instance, "mobile learning" on the list of emergent technologies was intended to be viewed as a conception. However, it is likely that those who considered mobile learning as learning with mobile hard- and software tools rated their perceived level of mastery with this technology differently than those who understood mobile learning as a conceptual technology. This conclusion is based upon interviews with some respondents in Course B who said that their understanding of the phrase, mobile learning, was transformed as a result of taking the course. While interview data captured some changes in thinking about what mobile learning meant, it is difficult to say if other conceptual and systemic emergent technology applications and goals were overlooked by respondents. Lastly, this misunderstanding of the intended use of the term, emergent technology, may have also explained why some respondents did not perceive a change in thinking when asked, although other data collected from these respondents indicated differently. It is therefore concluded that the definition of the term on the instruments must include examples of each form of technology. A dialogue on the term must be had with interviewees, rather than simply asking interviewees if they have any questions about the term. Other ideas on how to ensure that respondents interpret the term, emergent technologies, as intended by the researcher when conducting future research will also be considered.

There were a limited number of statements used on the quantitative questionnaires to operationalize the concepts of purpose, innovation, and reflective thought. As well, only 16 more commonly known emergent technologies were used to assess respondents' perceived level of mastery with emergent technologies (although respondents were given the option to add other emergent technologies to this list). In the future, it might be prudent to add more statements and emergent technologies to the questionnaires. The emergent technology list also needs constant revision to reflect new technologies.

Nevertheless, adding more questionnaire content must be weighed against considerations regarding the time and willingness of respondents to fill out lengthy questionnaires.

The final topic considered in this section is generalizability. The issue of generalizability is contentious. The study was limited to voluntary, English-speaking recruits from two MEd DE courses that shared many common elements. Respondents were most likely interested in the topic of emergent technologies. While this may have been a factor in who decided to participate in the study, the extent to which the respondents' interest in the topic of emergent technologies affected the findings is likely to be minimal. Most respondents, despite their paradigmatic preferences, rated themselves as being at the early practice level with emergent technology integration when the term began. Moreover, most respondents indicated that they had not taken a technology course in the MEd DE program before the study term. All respondents most likely lived in Canada at the time of the study, although a few had emigrated from other countries. The researcher felt that these limitations were acceptable given the exploratory nature of this study. Nevertheless, the most salient argument against the need for generalization is that critical pragmatists reject the notion of universal truths. As such, the study acknowledges the dynamic fluctuations between emergent technologies and educational paradigms, as well as between and within learners. Furthermore, it is expected that the models and findings generated from this study will evolve and expire, while new theories, models, and practices emerge.

A few recommendations have been made in this section that would improve similar studies in the future. More recommendations are considered next.

Recommendations

The first set of recommendations discussed herein includes suggestions for improving learner-empowered emergent technology integration, while the second considers future research options.

Learner-empowered emergent technology integration.

A number of government, institutional, curricular, and course-based recommendations are made based upon the findings of this study. To begin, respondents urged the government and educational institutions to improve free or cheap access for learners to the Internet, emergent technologies, apps, and other software. All stakeholders were also encouraged to become more conversant with these technologies. Suggestions included replacing or augmenting old technologies with newer ones and providing ongoing incentives for stakeholders at all levels to improve emergent technology skills on a perpetual basis. At the program level, respondents recommended frequent review of existing courses to ensure that older resources were either supplemented or replaced by current ones. Participants also pointed out how important it was for the institution, program, and course to make learning about emergent technologies relevant to other facets of learners' lives. Part of this recommendation included marrying theories, concepts, best practice principles, and research about emergent technologies with hands-on use of these technologies to promote deeper, more profound understanding about emergent technology integration. Moreover, some respondents felt that it was important not to focus instruction on a specific brand of technology or type of software, but rather to introduce a variety of similar options. This recommendation was based on the fact that specific technologies quickly become obsolete, or are popular only in small circles. A more global review of similar technologies would enable learners to quickly perceive patterns and unique features, thus helping them to knowledgeably select what technological resource would work best for them in various settings and situations.

At the program level, respondents recommended that more courses include assignments that learners could adapt with their instructors. While it was recognized that assignments that incorporated learning with new technologies typically took longer than writing traditional essays, respondents were willing to put in the extra time if the adapted assignment deepened their understanding and could help them achieve other life goals as well. Some respondents also welcomed group activities, indicating that such activities typically included swapping ideas, expertise, and tips on how to use communication and collaboration technologies. Lastly, respondents felt that instructors should encourage and model goal-setting, as well as use of emergent technologies in their courses.

A researcher recommendation is to help learners become more cognizant and self-evaluative of their learning aims and progress throughout the term. The study results indicate significant disparity between what some respondents said about changes in their thoughts about what empowered learners to integrate emergent technologies over the term, and what other data collected throughout the term showed. Therefore it is recommended that instructors and supervisory mentors empower learners by helping them to set goals, frequently reflect on their learning progress, and revise goals accordingly. The final recommendations relate to future research endeavours.

Future research.

This exploratory study represents the initial step in pursuing studies on the relationship between learner empowerment and the perpetual integration of emergent technologies for learning on demand. As such, many research recommendations spring to mind; a few of these are mentioned here.

Suggested minor changes to the instruments would include: (1) strategies to improve respondents' understanding of the term, emergent technology, (2) the addition of a few more statements for quantitatively operationalizing the conceptual variables, purpose, innovation, and reflective thought, and (3) updating of the emergent technologies list to include the most current popular emergent technologies used in education before the quantitative instruments are used again.

A new phase in the research process could involve recruiting a statistically-significant number of respondents to complete the quantitative questionnaires in a similar mixed methods study. Part of the purpose of this endeavour would be to ascertain the reliability of the instruments and the validity of statements used to measure operational definitions. The proposed study would also provide opportunity to re-test the paradigm shift framework and verify findings from the current study.

Another study could ask respondents who express preference for a particular paradigm, or whose paradigm preferences appear to be shifting, to sort the key empowerment factors identified in the current study in order of perceived importance. This would further confirm that there is a consistent pattern of key empowerment factor selections among learners who prefer a particular paradigm.

A third suggestion would be to gain institutional approval to expose respondents to an educational intervention intended to challenge existing beliefs about who controls their learning. A subsequent longitudinal study could establish how profound and long-lasting any resultant learner transformation was, and provide recommendations for continuing to foster self-empowered learning.

One more area of research to pursue is to determine if the paradigm shift framework and omni-tech taxonomy could be adapted for other areas of learning as well.

Finally, it recommended that an emergent technology integration course be designed, implemented, and researched, based upon the reviewed literature and findings in this study, as well as other pertinent resources. This proposed study would validate and extend the current research project.

Recommendations for enhancing learner empowerment and emergent technology integration opportunities, and future research endeavours provide an introduction to the significance of this study.

Significance of Study

This study is significant to all educational stakeholders, including government and institutional representatives, program leaders, faculty, instructors, students, educational researchers, and the wider academic community. The study appears to be the first of its kind to use a critical pragmatic framework and transformative mixed method research methodology to explore the relationship between learner empowerment and emergent technology integration. It also provides evidence that learning is a unique, dynamic process influenced by many empowerment factors within learners' unique PLEs.

This study puts forth recommendations for how stakeholders could improve learner empowerment, as well as emergent technology integration opportunities and practices. For instance, the study shows that the more self-determined a learner is the more intrinsically motivated that learner is to set, pursue, and achieve these goals. They access resources from their expansive PLN, yet are equally empowered to teach themselves how to use new technologies through trial and error. They tend to be learning leaders in their PLE. These attributes explain why such learners welcome the opportunity to adapt assignments with their instructors to meet these learners' personally relevant goals. Despite this innate drive to learn, however, the self-determined learners in this study did not require more scaffolding than their classmates. The significance of this finding cannot be understated. Such learners empower the instructor to escape the fallacious role of being the only true source of knowledge and embrace the power of learning *with* their students. This also reduces the amount of time required by the instructor to scaffold such learners. Moreover, this finding underscores the empowering role that emergent technology plays in connecting learners to a host of educational resources in their PLEs.

The study has highlighted the relationship between preferred learning paradigms, key factors that empower learners, and the acquisition of emergent technology integration skills. It shows that the more self-empowered a learner is, the more quickly they acquire higher levels of technology integration. It also amplifies how disempowered and passive learners who prefer a behavioural paradigm are. Finally, the study suggests, as hypothesized, that most learners are, indeed, in the midst of a paradigm shift.

This project has also contributed a paradigm shift framework, paradigm shift model, omni-tech taxonomy, four unique instruments, and operational definitions for conceptual variables used in the study. The framework, model, taxonomy, and instruments can be employed to measure and monitor learners' paradigm preferences and perceived levels of technology integration. The model can also be used to capture the attributes of a given learning environment and measure the paradigmatic effects among learners from any changes made to elements within that environment.

Engaging in this study has caused some respondents to challenge or re-affirm their thinking about learner-empowerment, as well as its relationship to perpetual emergent technology integration. It is hoped that respondents in this study continue to reflect on these issues as their learning journeys continue to unfold. It is also hoped that those who encounter this dissertation and subsequent publications pause to reflect on how the widespread adoption of a perceptual paradigm would revolutionize learning, society, and our world. These thoughts lead to final comments on this study.

Final Comments

The most significant operational challenge that this project faced was the lack of reference points to direct it. A paucity of literature existed on the critical pragmatic paradigm. No literature was found on how to merge critical pragmatism with transformative mixed methods methodology, let alone with a learner-focused project examining emergent technology integration. While there were a few published studies that incorporate principles of heutagogical practice (such as Canning, 2013; Dick, 2013; Garnett & O'Beirne, 2013; Kerry, 2013; Ramsay, Hurley, & Neilson, 2013), only Kerry (2013) considered post-graduate student use of mobile devices for learning. Unfortunately, the organization and structure of the Kerry project bore little resemblance to this study. Just one academic publication was found that expressed the heutagogical learning experience from the learner's perspective (that is, Brandt, 2013). It was a reflective piece completed by one learner after engaging in a heutagogically-designed post-secondary course. Furthermore, no educational paradigm shift or adequate learner-determined emergent technology integration models were found to facilitate the purpose of this study. These factors prompted the detailed presentation of this study.

The discussion in this dissertation has been highly theoretical and confrontational in nature. Overt expression of the researcher's epistemic, theoretical, and conceptual notions has been a deliberate attempt to bring voice, energy, and transparency into the project, as in keeping with a critical pragmatic research paradigm. Results from this study fuel the researcher's passionate to help learners reclaim the power over learning that they naturally possessed as children, and reaffirm that emergent technologies can help emancipate learners from the whims of the social elite. Nevertheless, *time is of the essence.*

Though it seems that the emancipatory potential of emergent technologies is beginning to be realized as access to technologies and information networks is spreading like wildfire across the globe, this may be no more than a fleeting, if not illusionary moment of freedom for humanity. Reviewed literature suggests that most formal online educators continue to use emergent technologies to replicate traditional educative processes and practices, while governments scramble to once again control the masses by eroding our freedoms in new ways. According to the 2013 *Systematic Government Access to Personal Data: A comparative analysis* report by the Center for Democracy & Technology (CDT), which examined government access laws and practices of 13 countries (including Canada):

> Technological advances are making it easier than ever for governments to collect, store and process information on a massive scale, and governments are exploiting this by demanding more and more information. As Internet-based services become increasingly globalized, trans-border surveillance has flourished. In a post-9/11 world, national security powers have been getting stronger. The expansion of governments' national security powers has been conducted in extreme secrecy. (CDT, 2013)

If these government and traditional educational practices continue, the once-inconceivable society of Orwell's (1949/2001) dystopian *Nineteen Eighty-Four* is global humanity's looming reality.

This is why it was critical to hear the voices of learners currently learning how to integrate emergent technologies for learning on demand. The learners in this study confirmed what the literature in Chapter 2 implied. Respondents who adhered to a behavioural learning paradigm felt profoundly disempowered, set no personal emergent technology integration goal, and did not improve their emergent technology skills over the term. These respondents placed greatest responsibility for their learning on the government, yet also felt that government changes were the primary disempowering emergent technology integration factor. Respondents preferring a perceptual paradigm were self-empowered, set goals, and acquired the highest level of emergent technology mastery amongst those involved in the study. These self-determined learning leaders placed greatest responsibility upon themselves for integrating emergent technologies. Moreover, they accessed a wide range of human and non-human resources within their PLEs, and were motivated to teach themselves as well.

Chapter 1 hypothesized that, due to increasing ubiquity of emergent technologies that enable learner empowerment, most learners are currently in the midst of a paradigm shift. The results of this study tentatively confirm this hypothesis, because three-quarters of the respondents shifted their preferences between paradigms during the term.

In conclusion, it is hoped that in some small way this project will prompt a few stakeholders to re-examine existing beliefs about the theory, nature, and power of learning, and the critical role that emergent technologies can play in learner emancipation before the social elite fully employ new ways of undermining this paradigmatic potential. Existing course restrictions prevent the researcher from introducing interventions deliberately designed to challenge respondents' perceptions on this topic, so the transformative potential for research stakeholders and other intended audiences is minimal. Nevertheless, the undertaking is viewed as an important, if miniscule first step in this transformative journey to learner empowerment.

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APPENDIX A: Department Head Letter of Information

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project by Norine Wark, EdD Candidate

Emerging technologies used in education are typically adopted from other fields so integration into the field often requires the co-evolution of emerging technologies and educational practices (Gros, 2016; Veletsianos, 2010). This constant flux between dynamically evolving emergent technologies and varying educational practices requires learners to adopt a mindset that enables them to cope with perpetual ambiguity, while thoughtfully and purposely integrating needed emerging technologies on an ongoing basis. Tweaking existing curricula or instructional practices offer transient, short-term solutions. What may be needed is a paradigm shift.

The study invites graduate students enrolled in the Spring 2017 term of MDDE 621 and MDDE 623 courses to participate in groundbreaking research on the key institutional, curricular, instructional, and contextual factors that empower students to integrate emergent technologies for learning on demand. I would like to recruit these students because they may possess vital information and insights that could lead to the development of a new educational paradigm, theories, and practices.

The study involves asking students to complete an online pre-course questionnaire, "Pre-course Perceptions of Emergent Technology Integration" (link to follow), which will take about 15 minutes to complete. This is followed by a mid-course telephone interview for a selected sample of students who completed the first online questionnaire, entitled "Identifying Learning Paradigm Preferences" (attached), which will take about 20 minutes. Students who complete the first online questionnaire will be invited for the online post-test questionnaire, "Post-test Perceptions of Emergent Technology Integration" (link to follow), which will take about 10 minutes to complete. A final telephone interview for those who completed the first interview will be conducted one to three weeks after the course is over. This final interview, "Revisiting Learning Paradigm Preferences" (attached), will take another 15 minutes. Please review these questionnaire and interview instruments carefully, so that you are aware of the questions that the students will be asked.

Approximately two months before the study begins, I would like to test the four instruments with 4-5 volunteers in a pilot study conducted in the AU MDDE 610 course taught by another instructor. I would like your permission to conduct the pilot study as well.

Once consent to conduct this research with students in your department is received, I would like to contact the course instructors to inform them about the study and seek consent to recruit their students.

All identifying information about the students, instructors, and course names and numbers will be coded or purged from the raw data before it is shared with the dissertation committee or others.

An email reply from you to me (norinewark@gmail.com) will indicate that you accept my invitation to have the identified graduate students from your department become part of the research project, as per the terms described above.

If you have any further questions or want clarification regarding this research, please contact me by phone: 250-843-7310, or through the email address above.

Sincerely,
Norine Wark,
EdD Doctoral Candidate

References:

Gros, B. (2016). The dialogue between emerging pedagogies and emerging technologies. In B. Gros, Kinchuk, & M. Maina (Eds.), *The future of ubiquitous learning: Learning designs for emerging pedagogies* (pp. 3-24). Heidleberg, Germany: Springer. Retrieved from http://link.springer.com/book/10.1007/978-3-662-47724-3?no-access=true

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APPENDIX B: Instructor Letter of Information

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project by Norine Wark, EdD Candidate

Emerging technologies used in education are typically adopted from other fields so integration into the field often requires the co-evolution of emerging technologies and educational practices (Gros, 2016; Veletsianos, 2010). This constant flux between dynamically evolving emergent technologies and varying educational practices requires learners to adopt a mindset that enables them to cope with perpetual ambiguity, while thoughtfully and purposely integrating needed emerging technologies on an ongoing basis. Tweaking existing curricula or instructional practices offer transient, short-term solutions. What may be needed is a paradigm shift.

The study invites graduate students enrolled in the Spring 2017 term of MDDE 621 (MDDE 623) to participate in groundbreaking research on the key institutional, curricular, instructional, and contextual factors that empower students to integrate emergent technologies for learning on demand. I would like to recruit these students because they may possess vital information and insights that could lead to the development of a new educational paradigm, theories, and practices.

The head of your department has granted permission to recruit AU students for this study. Nevertheless, I will not invite your students without your consent.

The study involves asking students to complete an online pre-course questionnaire, “Pre-course Perceptions of Emergent Technology Integration” (link to follow), which will take about 15 minutes to complete. This is followed by a mid-course telephone interview for a selected sample of students who completed the first online questionnaire, entitled “Identifying Learning Paradigm Preferences” (attached), which will take about 20 minutes. Students who complete the first online questionnaire will be invited for the online post-test questionnaire, “Post-test Perceptions of Emergent Technology Integration” (link to follow), which will take about 10 minutes to complete. A final telephone interview for those who completed the first interview will be conducted one to three weeks after the course is over. This final interview, “Revisiting Learning Paradigm Preferences” (attached), will take another 15 minutes. Please review these questionnaire and interview instruments carefully, so that you are aware of the questions that the students will be asked.

All identifying information about the students, course name and number, and yourself will be coded or purged from the raw data before it is shared with others.

Your students’ participation in any part of the project is completely voluntary. You may withdraw your class at any time.

All findings will be shared with the department, the students in this study, and you.

<u>How to proceed:</u>

If you support the involvement of your class in this research study, please complete and email the attached form to norinewark@gmail.com.

Contacting the researcher:

If you have any further questions or want clarification regarding this research, please contact me by phone: 250-843-7310, or through the email address above.

Sincerely,

Norine Wark,

EdD Candidate

*Please note: An Instructor Letter of Information will also be sent to the Winter 2017 MEd DE 610 course instructor to seek his permission to recruit students from this course for the pilot study. The only deviation from the above format is the timeline for testing the instruments. It is anticipated that the pilot study instruments will be completed over a 6 week period.

References:

Gros, B. (2016). The dialogue between emerging pedagogies and emerging technologies. In B. Gros,
Kinchuk, & M. Maina (Eds.), *The future of ubiquitous learning: Learning designs for emerging pedagogies* (pp. 3-24). Heidleberg, Germany: Springer. Retrieved from http://link.springer.com/book/10.1007/978-3-662-47724-3?no-access=true

Veletsianos, G. (2010). A definition of emerging technologies. In G. Veletsianos (Ed.), *Emerging technologies in education* (pp. 3-22). Edmonton, Alberta: Athabasca University Press. Retrieved from http://www.aupress.ca/index.php/books/120177

APPENDIX C: Instructor Consent Form

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project by Norine Wark, EdD Candidate

Instructor Consent Form

How to proceed:

If you are willing to allow recruitment access to your Athabasca University graduate students for this research study, please complete and return this form by email attachment to: norinewark@gmail.com

Please keep a copy of this completed form for your own records.

Support for Research Recruitment:

I have read the Instructor Letter of Information and have had any questions answered to my satisfaction, and I will keep a copy of this letter for my records. My email reply is meant to confirm my support for recruitment of my students to this research study, and that:

- I understand the expectations and requirements of the research;
- I understand the provisions around confidentiality and anonymity;
- I understand that my students' participation is voluntary
- I am aware that I may contact someone in addition to the researcher if I have any questions, concerns or complaints about the research procedures;

Instructor's First & Last Name: ______________________________ Date: ________________
(type name above) (type date above)

Consent is given for the following course: _______ (Pilot study & case study)

Contacting the researcher:

If you have any further questions or want clarification regarding this research or your participation, please contact:

Researcher: Norine Wark *e-mail*: norinewark@gmail.com *phone*: 250-843-7310

The Athabasca University Research Ethics Board has reviewed this research study and may be reached by e-mailing rebsec@athabascau.ca or calling 1-780-675-6718 if you have questions or comments about your role and/or your students' treatment as participants in this study.

APPENDIX D: Student Recruitment Email

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project by Norine Wark, EdD Candidate

Dear (student name):

Re.: Key factors affecting learner-empowered emergent technology integration research project

The dynamic co-evolution of emerging technologies and educational practices requires learners to cope with perpetual ambiguity while thoughtfully and purposely integrating new technologies on an ongoing basis. I am looking for volunteers to take part in a study that examines what key educational factors help learners most efficiently and effectively integrate emerging technologies (e.g., mobile devices, augmented reality, or virtual worlds) for learning now and in the future.

As a participant in this study, you would be asked to provide insights on your perceptions and experiences with integrating emergent technologies while you are engaged in the Athabasca University Spring 2017 MDDE 621 (MDDE 623) course. Involvement would begin with the completion of an online pre-course and post-course questionnaire. A few respondents who completed the first questionnaire would be invited to participate in a mid-course and post-course telephone interview. Interview questions are sent two weeks before the interview date so that you would have time to think about your responses. When the telephone interview is over, you would be given a copy of the interview transcript to edit before it is used for data analysis purposes. All data would be coded and identifying information purged before the results are shared with others. You would remain completely anonymous.

Your participation is **entirely voluntary** and would take approximately 15 minutes of your time for each online questionnaire and, if selected, 20 minutes for each of the two telephone interviews. The telephone interview would be conducted at a time that is convenient to you.

By participating in this study, you will help give learners a voice in the academic community on how emergent technologies are best integrated for learning. A copy of the published results will be provided to you as a small way to thank you for your participation and insights into this critical matter.

To learn more about this study, or to participate, please contact:

Principal Investigator:
Norine Wark: norinewark@gmail.com

This study is supervised by:
Dr. Mohamed Ally: mohameda@athabascau.ca

This study has been reviewed by the Athabasca University Research Ethics Board.

APPENDIX E: Online Participant Consent Form

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project *by Norine Wark, EdD Candidate*

ONLINE PARTICIPATION CONSENT FORM

Principal Researcher:
Norine Wark (norinewark@gmail.com)

Supervisor:
Dr. Mohamed Ally (mohameda@athabascau.ca)

You are invited to participate in a research study about the key factors that most empower learners to integrate emergent technologies on an ongoing basis. I am conducting this study as a requirement to complete my Doctorate in Distance Education degree.As a participant you will be asked to complete two online questionnaires. Each should take about 10 minutes of your time. A link to the first questionnaire is found at the end of this online consent. Further instructions about the questionnaire are included on the first and last pages of the questionnaire.

You will receive an email invitation to complete the second online questionnaire around the time that your current MDDE course ends. This post-course questionnaire should also take about 10 minutes to complete.

Based upon your responses on the pre-course questionnaire, you may be invited to participate in two follow-up telephone interviews. The first telephone interview will occur around the third week of the course and the second telephone interview will occur after the course is over. Both will be arranged at a time that is convenient to you. More details on the telephone interview process will be provided at the time that you are invited to be interviewed.

There are no anticipated risks to participating in this study. The main benefit that you will receive is the satisfaction of knowing that you have helped learners share their voice on this critical issue with other educational stakeholders and the greater academic community which may, in turn, evoke greater dialogue on the nature, theory, and power of learning in relation to emergent technology integration. Involvement in this study is entirely voluntary and you may refuse to answer any questions or to share information that you are not comfortable with. You will not be asked to provide any personal or identifiable information or data.

You may withdraw from the study at any time by simply closing your browser window, or by emailing the principal investigator at any time during the study and requesting that your data be purged from the database. Please print a copy of this consent form for your records.

All electronic data will be collected on a Canadian server, and kept in a password protected computer and back up password protected external hard drive at my office, along with any hard copy data that I may have. All information and records will be destroyed by confidential shredding. Electronic records will be deleted when all project requirements have been met (approximately by August, 2018).

Please note: The following pages constitute the consent form. If you have any questions about this research project or your role in it, please contact the researcher at norinewark@gmail.com before providing your consent.

I have read the previous pages on information about the study and have had any questions answered to my satisfaction. I will keep a copy of this letter for my records. By selecting "Submit" at the bottom of this page, I am consenting to participate in this research study, and that:

- I understand the expectations and requirements of my participation in the research;
- I understand the provisions around confidentiality and anonymity;
- I understand that my participation is voluntary, and that I am free to withdraw at any time with no negative consequences;
- I am aware that I may contact someone in addition to the researcher if I have any questions, concerns or complaints about the research procedures;
- I am granting permission for the researcher to use a digital audio recorder to record the interview if I am selected to participate in the interview process; and
- I am granting permission for the researchers to use anonymous quotes from me to be published in the dissertation and any subsequent presentations and publications that come from this study.

Results of this study will be published in the subsequent dissertation, which can be accessed through the AU Library. A copy of the dissertation will be sent to you as a token of my appreciation for your involvement in the study. You will also be provided with links to all other academic publications that directly result from this work.

If you are providing your consent to join this study, please enter your first and last names below.

First Name:	______________________	Last Name:	______________________

Select today's date:

(Calendar menu offered)

You have now successfully submitted your informed consent information.

Thank you for consenting to join this study. Your time and insights are greatly appreciated.

If you have any questions about this study or require further information, please contact the researcher, Norine Wark, or her supervisor, Dr. Ally, using the contact information above.

This study has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, please contact the Office of Research Ethics at 1-800-788-9041, ext. 6718 or by e-mail to rebsec@athabascau.ca

APPENDIX F: Pre-course Perceptions of Emergent Technology Integration

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project *by Norine Wark, EdD Candidate*

PRE-COURSE PERCEPTIONS OF EMERGENT TECHNOLOGY INTEGRATION

WELCOME
Welcome to the first questionnaire on key educational factors that help learners most efficiently and effectively integrate emerging technologies (such as mobile devices, augmented reality, or virtual worlds) for learning now and in the future. This questionnaire asks general questions about your perceptions and experiences with various emergent technologies in relation to your course setting, the general University program, and your personal and work environments.

A progress bar on each page indicates how much of the questionnaire you have completed as you move from one page to the next. Please use the navigation arrows at the bottom of each page, rather than the browser's default navigation arrows. (Using the browser's default navigation arrows will cause you to lose previously entered data.) At any time during the questionnaire you can save your responses, and return to complete the questionnaire at a future date. (This questionnaire will be available to you for a period of three weeks.)

Please note: All questions are mandatory. You must choose a response for each question in order to proceed to the next page of the questionnaire. If you have any questions at all, please email Norine Wark: norinewark@gmail.com

A Note about Privacy: Your confidentiality will be protected at all times. Your responses to this questionnaire will be recorded by code number only. Any quotes taken from the questionnaires or interviews to be used verbatim in subsequent publications or presentations will be non-identifying in nature. You will be identified only as an AU graduate student.

DEMOGRAPHICS
This section of the survey asks you to provide basic information about who you are and where you live.

A. Please select your age range from the groups provided:

1. 15-19 2. 20-24 3. 25-29 4. 30-34 5. 35-39 6. 40-44 7. 45-49 8. 50-54 9. 55-59 10. 60-64 11. 65-69 12. Over 70

Hint: Please select one response from the drop down menu above.

B. What is your gender?

1. Female
2. Male
3. No response

Hint: Please select one response from the drop down menu above.

C. Where do you live?

1. Large urban center (population over 500,000)
2. Medium urban (population of 100,000 to 499,999)
3. Small urban (10,000 to 99,999)
4. Rural (within 2 hours' commuting distance of large, medium or small urban center)
5. Remote (more than 2 hours' commuting distance of large, medium or small urban centers)

Hint: Please select the settlement that best describes where you are currently living by choosing one response from the list above.

D. How many online courses have you completed to date (not including enrolments for this term)?

1. 0 2. 1 3. 2 4. 3 5. 4 6. 5 7. 6-9 8. 10 or more

Hint: Please select one response from the drop down menu above.

AUTONOMY

For the purpose of this study, emergent technologies are defined as:
"tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33)

A. Currently, most decisions about the following aspects of Athabasca University Med (DE)/post-baccalaureate graduate level courses are made by:
(Choose one response for each aspect given below.)

	a. Student	**b. Student & Instructor**	**c. Instructor & Faculty**	**d. Faculty & Institute**	**e. Institute**	**f. Institute & Gov't.**	**g. Gov't.**
1.Admissions							
2.Curriculum							
3.Course syllabus							
4.Course objectives							
5.Course assignments							
6.Course grades							
7.Program timelines							
8.Course activity timelines							
9.Assignment timelines							
10. Study schedule							

Hint: Select one response for each aspect above.

B. In order for **me** to be best able to learn how to integrate emergent technologies on an ongoing basis, the following people should make most of the decisions about the following aspects: (Choose one response for each aspect given below.)

	a. Me	**b. Me & Instructor**	**c. Instructor & Faculty**	**d. Faculty & Institute**	**e. Institute**	**f. Institute & Gov't.**	**g. Gov't.**
1.Admissions							
2.Curriculum							
3.Course syllabus							
4.Course objectives							
5.Course assignments							
6.Course grades							
7.Program timelines							
8.Course activity timelines							
9.Assignment timelines							
10. Study schedule							

Hint: Select one response for each aspect above.

C. I typically learn the most about how to use a new technology from:
(Arrange the following in order of priority, where 1 = I learn the most from this source and 10 = I learn the least from this source.)

1. The formal course instructor
2. Other students in my online course
3. Class resources (including non-human resources and guest experts)
4. Non-class learning communities (e.g., MOOCs, online technical communities
5. Work-based communities of practice (e.g., professional development committee)
6. Online informal social networks (e.g., Facebook, Twitter)
7. Online information repositories (e.g., YouTube, blogs, wikis)
8. My children/younger family and friends
9. My spouse, siblings, or other family/friends in my age range or older than me
10. My own trial and error experiences with the new technology

Hint: Select one response for each statement above.

D. I learn the best:
(Arrange the following in order of priority, where 1 = I learn the best in this situation and 4 = I learn the least in this situation.)

1. Alone
2. One-on-one with another person (for example, myself and a tutor)
3. In small groups (that is, in groups of 3 to 10 people)
4. In typical class group sizes (that is, in groups of 20 to 30 people)
5. In MOOCs (that is, in classes with 100 or more people)

Hint: Select one response for each statement above.

PURPOSE

A. I have set a personal emergent technology integration goal that I plan on achieving during my enrolment in the MDDE 621 (MDDE 623) course this term.
(Choose one response from the four options below)

1. Yes
2. No
3. Not sure
4. No response

B. It is important for me to be able to perpetually integrate emergent technologies so that I can:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

(Economic/academic status)

1. Improve my career options
2. Obtain higher levels of academic certification
3. Remain competitive in global job market

(Social connections)

4. Interact more fully with experts, colleagues, peers
5. Interact more fully with informal social networks (for example, with friends, family)
6. Find and share information and other resources

(Altruistic learning)

7. Create new learning resources to empower others
8. Engage in the challenge of learning for the sake of learning
9. Use these technologies in innovative ways to solve real world problems

Hint: Select one response for each statement above.

C. The most important reason for me to learn how to integrate emergent technologies on an ongoing basis is:
(Choose one response for each statement below, where 1 = most important, 2 = of average importance, 3 = least important)

1. Economic
2. Social
3. To challenge myself

Hint: Select one response for each statement above.

MASTERY

A. (a. - p., as listed below). For this section of the questionnaire you are asked to assess to what degree you currently integrate various emergent technologies into your daily life.
(Choose one response for each emergent technology listed below, where:

0 = no response (no response)
1 = I know very little about this technology (little knowledge)
2 = I am gaining the basic skills and knowledge required to use this technology (acquisition)
3 = I am practicing how to use this technology (practice)
4 = I am able to use this technology as required for school or work (competency)
5 = I adapt this technology for use in unique or novel situations (capacity)

Technologies:

a. 3D printing
b. Augmented reality
c. Cloud computing
d. Conversational interfaces
e. Educational game technology
f. Flipped Classrooms
g. Interactive whiteboards
h. Learning analytics
i. Mobile learning
j. MOOCs
k. Online learning management systems
l. Online social networking
m. Open content
n. QR codes
o. Tablet computing
p. Wearable smart technology

Hint: Select one response for each emergent technology listed above.

B. My primary goal for learning how to integrate ***most*** emerging technologies is to:
(Choose the one statement below that is most often true for you.)

1. Know how to use the basic functions of a new technology for school or work purposes
2. Practice becoming comfortable with using a new technology
3. Be as competent with a new technology as my colleagues or peers
4. Transfer what I know about using a new technology to new situations
5. Discover functional and structural patterns of knowledge that are common to most emerging technologies, so that I can apply this knowledge to future technologies as they emerge

Hint: Select the one statement that best describes your reason for learning how to integrate emergent technologies.

INNOVATION

A. As a learner in school settings, I like to use emergent technologies to:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
3. Create new ways to interact with others
4. Transform the way I learn
5. Transform the way others learn

Hint: Select one response for each statement above.

B. In workplace settings, I like to use emergent technologies to:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
3. Create new ways to interact with others
4. Transform the way I learn
5. Transform the way others learn

Hint: Select one response for each statement above.

C. In home and other informal social settings, I like to use emergent technologies to:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
3. Create new ways to interact with others
4. Transform the way I learn
5. Transform the way others learn

Hint: Select one response for each statement above.

REFLECTION, CRITICAL REFLECTION, REFLEXIVITY

A. When I reflect upon my experiences with a new technology, typically my thoughts focus upon:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. How to use the new technology
2. What features (e.g., apps, media options) and functions I need to learn how to use

3. How the technology is being used by my class, school, organization, or social group
4. How the use of this technology affects the social structure in my class, school, organization, or social group
5. How the technology could be used to improve learner access to knowledge
6. How the technology might transform the way I learn

Hint: Select one response for each statement above.

FINAL COMMENTS

A. Please use the space below to add any comments that you might like to make about integrating current or future emergent technologies for learning.
(Open cgi bin for qualitative response)

B. Please use the space below to add any comments that you might like to make about this questionnaire or any other part of the research project.
(Open cgi bin for qualitative response)

QUESTIONNAIRE SUBMISSION

Thank you for your time and the insights that you have provided on this critical topic. You will receive a copy of the published results when they are ready as a small token of my appreciation.

Please note: When you press the 'Submit' button, you are deemed to be providing consent for inclusion of your data in this study.

Again, thank you for completing this questionnaire.

Sincerely,

Norine Wark,
Ed Doctoral Candidate

norinewark@gmail.com

APPENDIX G: Identifying Learning Paradigm Preferences

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project by Norine Wark, EdD Candidate

The following script will be sent by email .pdf attachment to selected respondents two weeks before the scheduled telephone interview. It will also be read during the recorded telephone interview.

PERSONAL DETAILS

Respondent code number: (to be completed by researcher)

INSTRUCTIONS

There are two terms that are used frequently in this interview script. For the purpose of this study:

A. *Emergent technologies* are defined as "tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33), and

B. *On demand* means that you can use the technology for learning whenever, whenever, and however you need or want to, now and in the future.

QUESTIONS

1. (For those who indicated that they set a personal emergent technology integration goal for the MDDE 621/623 term) a. Will the first assignment help you to achieve this goal? b. What other aspects of the AU MEd (DE)/post-baccalaureate program or the MDDE 621 (MDDE 623) course might help you achieve this goal?

2. What are the key Athabasca University (AU) institutional factors that empower you to integrate emergent technologies on demand (e.g., policies, practices)? Why do they empower you?

3. What are the key AU MEd (DE) curricular factors that empower you to integrate emergent technologies on demand (e.g., formal mobile learning curriculum)? Why do these empower you?

4. What are the key instructional factors in the MDDE 621 (MDDE 623) course that are most likely to empower you to integrate emergent technologies on demand (e.g., course outcomes, activities, assignments, use of technologies in class settings)? Why do they empower you?

5. What are the formal online school, workplace, or personal learning environment factors that most empower you to integrate technologies on demand (e.g., family members using the new technologies and encouraging you to use these technologies, too). Why do these environmental factors empower you?

6. Who do you think should hold the greatest responsibility for teaching you how to integrate emergent technologies for learning now and in the foreseeable future? Why?

7. What government, institutional, curricular, instructional, or learning environment changes do you think are needed to help you and other learners continue to integrate emergent technologies now and in the future, given the state of flux that emerging technologies and learning environments are in right now?

8. What other observations or comments would you like to make about integrating emergent technologies for learning on demand?

Please note: The researcher will send a transcribed copy of this interview to you via email attachment. You will be asked to verify and return the copy as your official interview transcript via email attachment.

Once received, this transcription indicates that you are providing consent for inclusion of this data in the study.

I would like to thank you for this valuable information and your time commitment to this project.

Sincerely,

Norine Wark,
Ed Doctoral Candidate
norinewark@gmail.com

APPENDIX H: Telephone Interview Protocol

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project *by Norine Wark, EdD Candidate*

TELEPHONE INTERVIEW PROTOCOL

A. Setting up the Interview:

1. Send potential telephone interviewees the following email approximately 2 weeks before possible interview date:

> Hello, (Respondent name):
>
> Re.: Shifting Paradigms: Learner empowered emergent technology integration - Interview invitation
>
> You have been chosen from the Spring 2017 Shifting Paradigms respondent pool to participate in a one-on-one telephone interview. This interview should take about 15-20 minutes of your time. The interview will be arranged at a time that is convenient for you, preferably within the next week or two, if possible.
>
> I will be conducting the interview with you. A copy of the interview questions is attached for your review.
>
> The interview will be digitally recorded. A transcription of the interview will then be sent by email attachment to you for editing and verification before it is added to the database for analysis processing. All information that may identify you will be removed from the transcribed copy of your interview. Any quotes taken from your interview for subsequent publications or presentations will be non-identifying in nature.
>
> Please email me if you accept or decline this invitation. If you accept, we can then arrange a time and phone number to conduct the interview by.
>
> If you have any questions or concerns, please do not hesitate to email me.
>
> Kind regards,
>
> Norine Wark,
> Ed Doctoral Candidate

2. Confirm date, time, and phone number for interview with interviewee by email.
3. Send reminder of date/time/phone number for interview to interviewee 2 days before anticipated interview date.

B. The Interview:

1. Before the recorder is turned on:
   a. Confirm that the interviewee can hear me clearly (I use a headset for recording purposes).

b. Inform the interviewee that the interview will be recorded, but that I will tell them when the recorder is turned on.
c. Confirm that this is still a good time for conducting the interview.
d. Explain the interview process, stating that I will review the transcription process after the interview is over.
e. Ask if there are any questions or comments before I turn the recorder on. Inform the interviewee that I will turn the recorder off at their request any time during the interview process. I will inform them that when the interview is over, I will be turning the recorder off. After the Interview is over and the recorder is turned off, we can discuss anything that the interviewee may want to off of the record.
f. After addressing any questions or concerns, I inform the interviewee that the recorder is now turned on.

2. After the interview:
   a. I ensure that the interviewee has said everything that they want to say on the record.
   b. Then I tell the interviewee that I am now going to turn the recorder off.
   c. Once the recorder is turned off, I ask if there are any questions or comments that the interviewee would like to make off of the record. I address these issues to the best of my ability. In some cases, this requires further research or follow-up by email (e.g., sometimes interviewees want to know something about the recording software/hardware that I use.)
   d. After addressing interviewee questions or comments, I go on to review the transcription process.

C. Verifying the Transcription:

a. I explain that I will be transcribing the interviews. It usually takes me 2-3 days to send a rough draft transcription to interviewees by email attachment.
b. I confirm the email address that the transcription is to be sent to. If there is concern about privacy, I provide the interviewee with an encryption code for opening the transcript.
c. I confirm what file format the interviewee would prefer for editing the rough draft transcription (e.g., rtf, .doc, .docx, .odt)
d. I inform the interviewee that they will receive a rough draft that will have all identifying information removed. The file name and their own name in the transcription will be replaced with a number that holds meaning only to me. Other references to the Institution, program, course, and any related identifying information will also be removed. If by any chance they accidently include any identifying information while editing and verifying the transcription, I will immediately remove that information upon the return of the file to me. I then go on to tell them that they are free to edit the rough draft transcription as they see fit. If possible, I would like the revised copy sent back to me a week after I send the rough draft to them. I will treat the revised good copy of the transcription that is sent back to me as the verified good copy of the interview. It is this copy that will be used for data analysis purposes. Verbatim quotes may also be taken from this copy for use in the dissertation and/or subsequent presentations/publications. However, such quotes will be void of any identifying information. (A brief summation of what the verified good copy of the transcript represents in the study is also written at the end of the

Appendices G and I, which are copies of the telephone interview script that are sent to potential interviewees approximately two weeks before the intended interview date.)

e. I then ask if there are any questions about the verification process.
f. Finally, I ask if there are any other questions or concerns about any part of the interview, or any other aspect of the research process.
g. I thank the participant for their time and insight into the topic at hand.
h. After the telephone conversation is over and I have transcribed the interview, I review the transcription for any possible identifying information, remove that information, replace the interviewee's name and course number with coded numbers that hold meaning only to me, and save the file in the interviewee's preferred file format under a coded number name.
i. I then send the following email to the interviewee:

Hello, (Respondent name):

Hopefully this email will find you getting a chance to relax and enjoy the summer (or some other appropriate pleasantry).

Attached please find a copy of the transcript from our telephone interview. (If you have any problem opening this document, just email and I will resend it in another file format.)

Please edit it as you see fit. If you are OK with the current version, could you please send me an email confirming this? Thank you.

Once I receive either the revised copy or an email confirming that the current copy meets your satisfaction, I will treat this copy as the officially-verified version of your interview. Receipt of this transcription (or confirmation email) will indicate that you are providing consent for inclusion of this data in the study. You may, however, withdraw any part of, or the entire transcript (or any other information that you have submitted during this study) at any time up to one month after the data collection process is complete (approximately [date to be inserted]). Requests for adaptation or withdrawal of your data can be made by emailing me at this address.

As promised, I will send you copies of, or links to the dissertation and any subsequent presentations/publications as they become available.

In the meantime, thank you again for your ongoing support with this study.

Kind regards,

Norine

j. Once I receive either the confirmation email or the verified good copy of the transcription, I review it, remove any outstanding identifying information, and save it to the qualitative database.

k. I save the interviewee's confirmation email for my own records.
l. I send an email confirmation to the interviewee that I have received the transcription. If there was a need to remove any identifying information, I send a copy of the updated version to the interviewee for their records.

APPENDIX I: Post-course Perceptions of Emergent Technology Integration

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

A research project *by Norine Wark, EdD Candidate*

POST-COURSE PERCEPTIONS OF EMERGENT TECHNOLOGY INTEGRATION

WELCOME

Welcome to the post-course questionnaire on key educational factors that help learners to most efficiently and effectively integrate emerging technologies (for example, mobile devices, augmented reality, or virtual worlds) for learning now and in the future. This questionnaire asks you to once again to share your perceptions and experiences with various emergent technologies in relation to your MDDE course setting, the general Athabasca University MEd (DE)/post-baccalaureate program, and your personal and work environments. Your responses to this questionnaire will be used to determine if your perceptions have changed since you began this course.

A progress bar on each page indicates how much of the questionnaire you have completed as you move from one page to the next. Please use the navigation arrows at the bottom of each page, rather than the browser's default navigation arrows. (Using the browser's default navigation arrows will cause you to lose previously entered data.) At any time during the questionnaire you can save your responses, and return to complete the questionnaire at a future date. (This questionnaire will be available to you for a period of three weeks.)

Please note: All questions are mandatory. You must choose a response for each question in order to proceed to the next page of the questionnaire. If you have any questions at all, please email Norine Wark: norinewark@gmail.com

A Note about Privacy: Your confidentiality will be protected at all times. Your responses to this questionnaire will be recorded by code number only. Any quotes taken from the questionnaires or interviews to be used verbatim in subsequent publications or presentations will be non-identifying in nature. You will be identified only as an online graduate student in a North American post-secondary institution.

AUTONOMY

For the purpose of this study, emergent technologies are defined as:
"tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33)

A. Currently, most decisions about the following aspects of Athabasca University MEd (DE)/post-baccalaureate graduate level courses are made by:

(Choose one response for each aspect given below.)

a. Student	b. Student & Instructor	c. Instructor & Faculty	d. Faculty & Institute	e. Institute	f. Institute & Gov't.	g. Gov't.

	a. Student	b. Student & Instructor	c. Instructor & Faculty	d. Faculty & Institute	e. Institute	f. Institute & Gov't.	g. Gov't.
1.Admissions							
2.Curriculum							
3.Course syllabus							
4.Course objectives							
5.Course assignments							
6.Course grades							
7.Program timelines							
8.Course activity timelines							
9.Assignment timelines							
10. Study schedule							

Hint: Select one response for each aspect above.

B. In order for **me** to be best able to learn how to integrate emergent technologies on an ongoing basis, the following people should make most of the decisions about the following aspects:

(Choose one response for each aspect given below.)

	a. Me	b. Me & Instructor	c. Instructor & Faculty	d. Faculty & Institute	e. Institute	f. Institute & Gov't.	g. Gov't.
1.Admissions							
2.Curriculum							
3.Course syllabus							
4.Course objectives							
5.Course assignments							
6.Course grades							
7.Program timelines							
8.Course activity timelines							
9.Assignment timelines							
10. Study schedule							

Hint: Select one response for each aspect above.

C. I typically learn the most about how to use a new technology from:

(Arrange the following in order of priority, where 1 = I learn the most from this source and 10 = I learn the least from this source.)

1. The formal course instructor
2. Other students in my online course
3. Class resources (including non-human resources and guest experts)
4. Non-class learning communities (e.g., MOOCs, online technical communities
5. Work-based communities of practice (e.g., professional development committee)
6. Online informal social networks (e.g., Facebook, Twitter)
7. Online information repositories (e.g., YouTube, blogs, wikis)
8. My children/younger family and friends
9. My spouse, siblings, or other family/friends in my age range or older than me
10. My own trial and error experiences with the new technology

Hint: Select one response for each statement above.

D. I learn the best:

(Arrange the following in order of priority, where 1 = I learn the best in this situation and 4 = I learn the least in this situation.)

1. Alone
2. One-on-one with another person (e.g., myself and a tutor)
3. In small groups (that is, in groups of 3 to 10 people)
4. In typical class group sizes (that is, in groups of 20 to 30 people)
5. In MOOCs (that is, in groups of 100 or more people)

Hint: Select one response for each statement above.

PURPOSE

E. I achieved a personal emergent technology integration goal during my enrolment in the MDDE 621 (MDDE 623) course this term.

(Choose one response from the four options below)

1. Yes
2. No
3. Not sure
4. No response

Hint: Select one response for each statement above.

F. This course exposed you to a wide variety of emergent technology integration concepts, processes, and practices (Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. I required more instructor or expert support than most students to learn about the various emergent technology integration topics in this course.

2. I experienced a significant learning curve upon being exposed to emergent technology integration topics in this course.

Hint: Select one response for each statement above.

G. It is important for me to be able to perpetually integrate emergent technologies so that I can:

(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

(Economic/academic status)
1. Improve my career options
2. Obtain higher levels of academic certification
3. Remain competitive in global job market

(Social connections)
1. Interact more fully with experts, colleagues, peers
2. Interact more fully with informal social networks (for example, with friends, family)
3. Find and share information and other resources

(Altruistic learning)
1. Create new learning resources to empower others
2. Engage in the challenge of learning for the sake of learning
3. Use these technologies in innovative ways to solve real world problems

Hint: Select one response for each statement above.

H. The most important reason for me to learn how to integrate emergent technologies on an ongoing basis is:

(Choose one response for each statement below, where 1 = most important, 2 = of average importance, and 3 = least important)

1. Economic
2. Social
3. To challenge myself

Hint: Select one response for each statement above.

MASTERY

I. (a. - p., as listed below). For this section of the questionnaire you are asked to assess to what degree you currently integrate various emergent technologies into your daily life.
(Choose one response for each emergent technology listed below, where:

0 = no response (no response)
1 = I know very little about this technology (little knowledge)
2 = I am gaining the basic skills and knowledge required to use this technology (acquisition)
3 = I am practicing how to use this technology (practice)
4 = I am able to use this technology as required for school or work (competency)
5 = I adapt this technology for use in unique or novel situations (capacity)

Technologies:

a. 3D printing
b. Augmented reality
c. Cloud computing
d. Conversational interfaces
e. Educational game technology
f. Flipped Classrooms
g. Interactive whiteboards
h. Learning analytics
i. Mobile learning
j. MOOCs
k. Online learning management systems
l. Online social networking
m. Open content
n. QR codes
o. Tablet computing
p. Wearable smart technology

Hint: Select one response for each emergent technology listed above.

J. My primary goal for learning how to integrate most emerging technologies is to: (Choose the one statement below that is most often true for you.)

1. Know how to use the basic functions of a new technology for school or work purposes
2. Practice becoming comfortable with using the technology
3. Be as competent with the new technology as my colleagues or peers
4. Transfer what I know about using the new technology to new situations
5. Discover functional and structural patterns of knowledge that are common to most emerging technologies, so that I can apply this knowledge to future technologies as they emerge

Hint: Select the one statement that best describes your reason for learning how to integrate emergent technologies.

INNOVATION

K. As a learner in school settings, I like to use emergent technologies to:

(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
3. Create new ways to interact with others
4. Transform the way I learn
5. Transform the way others learn

Hint: Select one response for each statement above.

L. In workplace settings, I like to use emergent technologies to:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
1. Create new ways to interact with others
2. Transform the way I learn
3. Transform the way others learn

Hint: Select one response for each statement above.

M. In workplace settings, I like to use emergent technologies to:
(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. Solve problems
2. Create new products/resources
3. Create new ways to interact with others
4. Transform the way I learn
5. Transform the way others learn

Hint: Select one response for each statement above.

REFLECTION, CRITICAL REFLECTION, REFLEXIVITY

N. When I reflect upon my experiences with a new technology, typically my thoughts focus upon:

(Choose one response for each statement below, where 0 = no response, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

1. How to use the new technology
2. What features (e.g., apps, media options) and functions I need to learn how to use
3. How the technology is being used by my class, school, organization, or social group
4. How the use of this technology affects the social structure in my class, school, organization, or social group
5. How the technology could be used to improve learner access to knowledge

6. How the technology might transform the way I learn

Hint: Select one response for each statement above.

FINAL COMMENTS

O. Please use the space below to add any comments that you might like to make about integrating current or future emergent technologies for learning.

(Open cgi bin for qualitative response)

P. Please use the space below to add any comments that you might like to make about this questionnaire or any other part of the research project.

(Open cgi bin for qualitative response)

QUESTIONNAIRE SUBMISSION

Thank you for your time and the insights that you have provided on this critical topic. You will receive a copy of the published results when they are ready as a small token of my appreciation.

Please note: When you press the 'Submit' button, you are deemed to be providing consent for inclusion of your data in this study.

Again, thank you for completing this questionnaire.

Sincerely,

Norine Wark,
Ed Doctoral Candidate
norinewark@gmail.com

APPENDIX J: Revisiting Learning Paradigm Preferences

KEY FACTORS AFFECTING LEARNER-EMPOWERED EMERGENT TECHNOLOGY INTEGRATION

REVISITING LEARNING PARADIGM PREFERENCES
Post-course Telephone Interview Script

A copy of the respondent's first telephone interview transcript and the following script will be sent by email .pdf attachment to selected respondents two weeks before the scheduled telephone interview. The following script will also be read during the recorded telephone interview.

PERSONAL DETAILS

Respondent code number: (to be completed by researcher)

INSTRUCTIONS

There are two terms that are used frequently in this interview script. For the purpose of this study:

A. *Emergent technologies* are defined as "tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes" (Veletsianos, 2010, p. 33), and

B. *On demand* means that you can use the technology for learning whenever, whenever, and however you need or want to, now and in the future.

QUESTIONS

1. (For those who indicated that they set a personal emergent technology integration goal for the MDDE 621/623 term) a. Did the first assignment help you achieve your intended goal? b. Did you revise your plan after completing the assignment? c. What other aspects of the AU MEd (DE)/post-baccalaureate program or the MDDE 621 (MDDE 623) course helped you achieve this goal? d. Did you achieve your goal, change your goal, or set a different goal as a result of your exposure to this course?

2. What do you now think the key Athabasca University (AU) institutional factors are that empower you to integrate emergent technologies on demand (e.g., policies, practices)? Why do they empower you?

3. What do you now think the key AU MEd (DE) curricular factors are that empower you to integrate emergent technologies on demand (e.g., formal mobile learning curriculum)? Why do these empower you?

4. What do you now think the key instructional factors in the MDDE 621 (MDDE 623) course are that are most likely to empower you to integrate emergent technologies on demand (e.g., course outcomes, activities, assignments, use of technologies in class settings)? Why do they empower you?

5. What do you now think the formal online school, workplace, or personal learning environment factors are that most empower you to integrate technologies on demand

(e.g., family members using the new technologies and encouraging you to use these technologies, too). Why do these environmental factors empower you?

6. Who do you now think should hold the greatest responsibility for teaching you how to integrate emergent technologies for learning now and in the foreseeable future? Why?

7. What government, institutional, curricular, instructional, or learning environment changes do you now think are needed to help you and other learners continue to integrate emergent technologies now and in the future, given the state of flux that emerging technologies and learning environments are in right now?

8. Have your ideas about the key factors that most empower you or other learners to integrate emergent technologies on demand changed as a result of having completed this course? Why or why not?

9. What other observations or comments would you like to make about integrating emergent technologies for learning on demand?

Please note: The researcher will send a transcribed copy of this interview to you via email attachment. You will be asked to verify and return the copy as your official interview transcript via email attachment. Once received, this transcription indicates that you are providing consent for inclusion of this data in the study.

I would like to thank you for this valuable information and your time commitment to this project.

Sincerely,

Norine Wark,
Ed Doctoral Candidate
norinewark@gmail.com

APPENDIX K: Athabasca University Research Ethics Board Approval

Athabasca University
RESEARCH CENTRE

CERTIFICATION OF ETHICAL APPROVAL

The Athabasca University Research Ethics Board (AUREB) has reviewed and approved the research project noted below. The AUREB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and Athabasca University Policy and Procedures.

Ethics File No.: **22514**

Principal Investigator:
Mrs. Norine Wark, Graduate Student
Centre for Distance Education\Doctor of Education in Distance Education

Supervisor:
Dr. Mohamed Ally (Supervisor)

Project Title:
Shifting Paradigms: A critical pragmatic evaluation of key factors affecting learner-empowered emergent technology integration

Effective Date: February 28, 2017 **Expiry Date**: February 27, 2018

Restrictions:
Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e. all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date:** February 28, 2017
Sherri Melrose, Chair
Athabasca University Research Ethics Board

Athabasca University Research Ethics Board
University Research Services, Research Centre
1 University Drive, Athabasca AB Canada T9S 3A3
E-mail rebsec@athabascau.ca
Telephone: 780.675.6718

APPENDIX L: Athabasca University Research Ethics Board Approval - Renewal

Athabasca University
RESEARCH CENTRE

CERTIFICATION OF ETHICAL APPROVAL - RENEWAL

The Athabasca University Research Ethics Board (AUREB) has reviewed and approved the research project noted below. The AUREB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and Athabasca University Policy and Procedures.

Ethics File No.: **22514**

Principal Investigator:
Mrs. Norine Wark, Graduate Student
Centre for Distance Education\Doctor of Education in Distance Education

Supervisor:
Dr. Mohamed Ally (Supervisor)

Project Title:
Shifting Paradigms: A critical pragmatic evaluation of key factors affecting learner-empowered emergent technology integration

Effective Date: February 20, 2018 **Expiry Date**: February 19, 2019

Restrictions:

Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e. all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date:** February 20, 2018

Joy Fraser, Chair
Athabasca University Research Ethics Board

Athabasca University Research Ethics Board
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