

Digitizing Healthcare Education:

An exploratory study of early adopters of e-learning technologies
in healthcare

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Abstract

Dialogue in healthcare education indicates the desire to incorporate innovative communicative technologies into traditional teaching practice. However, utilization of information and communication technologies (ICT) in healthcare education is varied and evolving, leaving educators and their organizations challenged as how best to use emerging ICT to its full potential. This exploratory research study examined “how” and “why” six early adopters of ICT in their teaching method at the University of Alberta incorporated technology into their instructional practice. Qualitative data obtained using semi-structured interview methodology was examined within the context of Rogers Diffusion of Innovations theory, and findings suggest that these early adopters of ICT share common frames of reference – risk taking and problem solving – which allow them to mitigate the challenges of adopting innovative teaching technologies. Although further research is needed to determine if the findings of this exploratory study can be extrapolated to other learning institutions delivering healthcare education, or educators outside healthcare, this understanding of the early adopter may guide organizations in planning strategies that move forward the diffusion of ICT use in healthcare education.

I. Introduction

Ongoing conversation in healthcare education reveals that both educators and students want innovative communication technologies incorporated into traditional teaching practice. However, the use of information and communication technologies (ICT) in healthcare education is not standardized in its adoption, or application. The literature suggests the use of digital platforms for e-learning is varied and evolving, leaving educators challenged as how best to use emerging ICT to its full potential.

This exploratory study will look at a group of healthcare educators who have incorporated various technologies into their instructional practice, and whether this group of early adopters provides a common frame of reference for e-learning technology adoption in traditional healthcare education. Insights from this exploratory study may provide understanding and direction for other healthcare educators and/or healthcare programs looking to incorporate ICT into their educational practice. Further, insights gained from early adopters of e-learning in educational practice may provide a basis for additional research to explore whether their practices can minimize the challenges of ICT adoption and use in healthcare education.

Research into the topic of ICT adoption is important because today's student is a "digital native" and often is more comfortable engaging with technology as a method of learning. Thomas (2011) in *Technology, Education, and the Discourse of the Digital Native* maintains that dialogue and understanding surrounding ICT use in education is crucial. This author states that educators adopting ICT's into their instructional practice should be mindful of three salient assumptions when teaching "digital natives", the generation born after 1980. This generation is assumed to:

1. constitute a largely homogenous generation and speak a different language vis-à-vis digital technologies, as opposed to their parents, the “Digital Immigrants”;
2. learn differently from preceding generations of students; and
3. demand a new way of teaching and learning involving technology (Thomas, 2011, p. 4).

Given many healthcare educators are not of the same generation as the students they teach and mentor, understanding the early adopters of ICT in healthcare education holds merit both for students and educators in the evolving landscape of healthcare education.

A. Background

In the current era of web 2.0, healthcare educators discuss the need to integrate diverse digital technologies into educational practice (Ward, Gordon, Field & Lehmann, 2001; Whitcomb, 2003). Harden (2008) in his commentary *E-learning – Caged Bird or Soaring Eagle?* goes a step further in this discussion. He indicates that the utilization of ICT’s can enrich the learning experience in a more adaptive and personalized manner for students. Hence, the metaphor: “students as caged birds or instead empower them with appropriate education opportunities to soar like the eagle” (Harden, 2008, p. 4). The value of engaging students who are primarily digital natives to learn subject matter with the digital media that they are often most comfortable learning in has been noted (Palfrey & Gasser, 2008, pp. 237-253).

Healthcare educators strive to create optimal learning environments for the students they mentor and educate. However, anecdotal observation finds integration of various digital tools of ICT is haphazard. A wide array of diverse e-learning tools for adoption by educators exists, but for the healthcare educator without a background in educational technology and who is not tech savvy, integrating new teaching methods can be daunting. This sentiment is echoed in the results of a qualitative study by Hillenburg, Cederberg,

Gray, Hurst, Johnson, and Potter (2006) that sought opinions on IT, and its future in dental education. Their research confirms that change towards a technologically advanced curriculum is slow, uneven, and indicates traditional dental schools “are used to learning the old way” (p. 171).

Here lies an observable gap in healthcare education – individuals or pockets of healthcare educators are using digital platforms extensively in their teaching practice, but the majority of educators are still using traditional teaching methods as they struggle to determine “how” best to use emerging technology to its full potential. This gap has led me to question “why” adoption of diverse digital platforms is slow to diffuse in healthcare education. Moreover, I have wondered if early adopters possess a frame of reference or specific characteristics that minimize the challenges of integrating new learning technologies into their practice.

B. Clarification of terms

For the purpose of this exploratory study, the use of ICT tools in healthcare education will be referred to as e-learning. In the medical educator’s literature, “e-learning is defined as learning mediated by technology, such as the World Wide Web, intranet, and multi-media based computer applications” (Kim, 2006, p. 2).

ICT has been broadly defined as: “the combination of informatics technology with other, related technologies, specifically, communication technology” (UNESCO, 2002) and “includes technologies such as desktop and laptop computers, software, peripherals, and connections to the Internet that are intended to fulfill information processing and communications functions” (Statistics Canada, 2008). It should be noted that ICT is often used synonymously with information technology (IT) in the literature, however ICT is a

more specific term that focuses on technologies that allow users to access, transmit, store, and manipulate information (Sallai, 2012). Hence, ICT and IT in the text of this paper may be used interchangeably as they refer to communications technology used in education that mediates the sharing and transfer of information/knowledge for learning.

Palfrey and Gasser in *Born Digital: Understanding the First Generation of Digital Natives* provide the following definitions:

- Digital native: A person born into the digital age (after 1980) who has access to networked digital technologies and strong computer skills and knowledge. Digital natives share a common global culture that is defined not strictly by age but by certain attributes and experiences related to how they interact with information technologies, information itself, one another, and other people and institutions.
- Digital Immigrant: A person who has adopted the Internet and related technologies, but who was born prior to the advent of the digital age (2008, p. 352).

C. Research problem and question

Salient to ongoing conversations regarding “how” to incorporate e-learning into current healthcare teaching practice, is the question of “why” innovative IT tools are not standardized in their adoption, or utilization. Hence, the problem statement/question underlying this exploratory inquiry asks: Why has the adoption of emerging, innovative communicative technologies of knowledge and information sharing been slow to diffuse in traditional healthcare educational practice?

In attempting to discover insights into this broad issue, this exploratory inquiry will focus on qualitative data gathering to seek understanding about a narrower sub-question: How are e-learning technologies currently utilized extensively in teaching practice by healthcare educators in traditional healthcare education who could be viewed as “early adopters”? Qualitative inquiry could provide knowledge regarding characteristics, or

frames of reference in healthcare educators that may influence future diffusion of IT in healthcare education.

D. Epistemological – ontological paradigm

This study will seek knowledge and understanding through the process of discovery (Merrigan, Huston & Russell, 2012, pp. 34-44). Knowledge by discovery provides the paradigm to guide my qualitative study of how healthcare educators extensively use IT in their practice, as it assumes:

...things or objects exist in reality separate from our perceptions; this reality is discoverable; knowledge of reality is testable through empirical methods that are precise, systematic and repetitive (Merrigan et al., 2012, pp. 35-36).

Ontologically, pragmatism can result in findings that manifest as: objective traits, behaviors, or other salient frames of reference in early IT adopters, thus providing useful or translatable knowledge that could minimize the challenges of e-learning and IT adoption (Craig & Muller, 2007, pp.499-500; Littlejohn & Foss, 2008, pp.16-18). Practical understanding and knowledge for all healthcare educators in the area of e-learning can move this emerging practice into the mainstream, and lead educators to find their best practice in a digitally connected world.

E. Theoretical lens

Diffusion of innovations theory (Rogers, 2003) will provide the lens for this qualitative study of healthcare educators using IT in their teaching practice. Rogers' theory includes five idealized types of adopters – innovators; early adopters; early majority; late majority; and laggards (Rogers, 2003, pp. 282-285).

Rogers (2003) has made the following generalizations regarding characteristics of the adopter categories (pp. 287-292):

- Earlier adopters are no different from later adopters in age.
- Earlier adopters have more years of formal education than do late adopters.
- Earlier adopters are more likely to be literate than are later adopters.
- Earlier adopters have higher social status than do later adopters.
- Earlier adopters have a greater degree of upward social mobility than do later adopters.
- Earlier adopters have larger-sized units (farms, schools, companies, and so on) than do later adopters.
- Earlier adopters have greater empathy than do later adopters.
- Earlier adopters may be less dogmatic than are later adopters.
- Earlier adopters have a greater ability to deal with abstractions than do later adopters.
- Earlier adopters have greater rationality than do later adopters.
- Earlier adopters have more intelligence than do later adopters.
- Earlier adopters have a more favorable attitude toward change than do later adopters.
- Earlier adopters are better able to cope with uncertainty and risk than later adopters.
- Earlier adopters have a more favorable attitude toward science than do late adopters.
- Earlier adopters are less fatalistic than are later adopters.
- Earlier adopters have higher aspirations than do late adopters.
- Earlier adopters have more social participation than do later adopters.
- Earlier adopters are more highly interconnected through interpersonal networks in their social system than are later adopters.
- Earlier adopters are more cosmopolite than are later adopters.
- Earlier adopters have more contact with change agents than do later adopters.
- Earlier adopters have greater exposure to interpersonal communication channels than do later adopters.
- Earlier adopters seek information about innovation more actively than do later adopters.
- Earlier adopters have greater knowledge of innovations than do later adopters.
- Earlier adopters have a higher degree of opinion leadership than do later adopters.

The author notes that these idealized types are derived from empirical study with no sharp breaks in adjacent categories. Rather, the categories represent a continuum with differing distinguishing characteristics (Rogers, 2003, p. 282).

It is important to acknowledge that these characteristics may hold true for any early adopter when we look retrospectively at an innovation or new idea that has run its course of diffusion within a social system. However, when looking at innovations or ideas early in the diffusion cycle more specific frames of reference would be meaningful to identify those within the population considered to be the early adopters. In *Diffusion of Innovations in Health Service Organizations: A Systematic Literature Review* (Greenhalgh, Robert, Bate, Macfarlane & Kyriakidou, 2005) the authors indicate that adopter categories and the diffusion curve are part of a descriptive model that does not directly explain, or predict adoption of an innovation. Nor do adoption curves explain the “how or why” of an innovation in its context (p. 58). If frames of reference could be identified within a fairly homogenous population such as early adopters of IT in healthcare education, perhaps knowledge of their experiences and perceptions with technology use in their teaching curricula for healthcare students could fill in some of the missing pieces to shed understanding on the “how and why” of IT adoption in healthcare education.

Given that practice of e-learning is not standardized or widespread in healthcare education, those educators whose practice incorporates diverse and numerous digital tools can be categorized as “early adopters” (Rogers, 2003, p. 281). The “early adopter” ideal type is described in the Diffusion of Innovations theory by terms/phrases such as: “localites” – an integrated part of their social system; “respected by peers”; and “serve as role models” in their social systems. According to this categorization, early adopters hold a high degree of “opinion leadership” in their social systems. They can be a point of reference for advice and information regarding emerging innovation, and influence others considering the “innovation” (Rogers, 2003, p. 283). Through this theoretical lens of

Diffusion of Innovations, the early adopters of e-learning in medical education may provide valuable knowledge as to the “how” and “why” of e-learning adoption in medical education, and lead research further in strategy development for the diffusion of IT and its affordances in teaching healthcare professionals.

II. Literature Review

This literature review will explore three topic areas relevant to e-learning adoption in healthcare education. The areas are: e-learning in medical training (physician education); e-learning in other healthcare disciplines (focus on dental education); and e-learning in general education.

A. Discussion of e-learning in medical education

Dialogue in the literature indicating a desire to incorporate innovative communicative technologies into traditional teaching practice in healthcare dates back to the late 1990s – the period of time when the affordances of the World Wide Web were evolving into what we now know as Web 2.0. Mooney and Bligh (1997) speak to an observable gap in healthcare education: the desire to incorporate e-learning technologies into teaching practice versus the actual adoption of these technologies into one’s teaching method.

A common thread emerges in the research literature about medical education and e-learning. Communication and information technologies bring new opportunities and challenges to healthcare educators, but the affordances of IT in the healthcare educator’s practice are not incorporated in a standardized or widespread manner, even though medical educators see the value IT can add to the student – instructor interaction.

Mooney and Bligh (1997) state: “IT has the potential to revolutionize the way medicine is learned by students and healthcare professionals ... [and they indicate] this has been recognized by the General Medical Council in a 1993 report” (p. 701). However, their study of IT awareness conducted in 1995 surveying 116 new medical students found: “92% of students use computers in their life - daily; 47% thought they would use

computers as doctors; but, 25% of students used computers at school” (Mooney & Bligh, 1997, p. 701). This early study highlights two significant points still seen in traditional healthcare education. First, each generation of healthcare students expects to use the IT of their era in their educational processes. Secondly, a gap exists in medical education between the e-learning strategies that are utilized and what could be used: this is evidenced in 92% daily use of IT versus 25% school use of IT. These authors concluded that the information technologies of the era were not being used to their potential, and that the challenge for educators was to develop innovative strategies to maximize IT’s educational value (Mooney & Bligh, 1997, p.704).

Ward et al. (2001), and Kim (2006) stated similar concerns in their more recent research: IT use in medical education is not as pervasive in the student experience as it is in daily life, where information and knowledge is transferred and shared in diverse digital platforms. This presents missed learning opportunities in the student/educator interaction. While these authors indirectly discuss the problem statement/question that I have presented: “why is the adoption of emerging, innovative communicative technologies of knowledge and information sharing often slow to diffuse in traditional healthcare educational practice”, they see the gap as rooted in the structural constructs of a organizational tradition. Both articles concluded that medical schools need to design strategies, evaluate IT effectiveness, and train educators in IT use to narrow the gap between how IT is currently being implemented and the level that would allow IT to reach its potential value in healthcare education. “Without an evolving knowledge base on how best to design e-learning applications, the gap between what we know about technology use and how we deploy e-learning in training settings will continue to widen” (Kim, 2006, p.1).

In the medical education literature, a body of literature centers on curricular change. Bland, Starnaman, Wersal, Moorehead-Rosenberg, Zonia, and Henry (2000) conducted a systematic literature review titled: *Curricular Change in Medical Schools: How to Succeed*. Although this study did not specifically look at ICT adoption in medical education, it highlights the lack of research focus on the early adopter as an agent of change in the diffusion process. This review involved searches through databases such as *Medline*, *ERIC*, *Education Abstracts*, and *MNCAT* from 1966 to 1999 using the keywords “medical education and change”, “medical education and curriculum change”, and “higher education and curriculum change” resulting in 57 sources for analysis (Bland et al., 2000, p. 576). The study looked at change within three categories – Context, Curriculum, and Process, and numerous sub-categories. Within the Process category, the authors speak about the issue of adoption as part of the initiation stage of change with new innovative methods. These authors state in their abstract: “society’s changing needs, advancing knowledge, and innovations in education require constant changes of medical school curricula. But successful curricular change occurs only through the dedicated efforts of effective change agents” (Bland et al., 2000, p. 575). What is striking about this systematic review of the literature is that the authors found “leadership” was the most often cited factor affecting curricular change, where leaders were stated to be “the dean, a senior faculty member with the sponsorship of the dean, or a team of faculty representing the dean” (Bland et al., 2000, p. 575, 590). These authors conclude organizational leadership underpins the adoption of innovation in the curricular change process, and acts as the agent of change in the organization. This systematic literature review of curricular change in medical education does not mention early adopters of

curricular changes in their educational method, even though they may play a role in the organization's adoption process.

Ruiz, Mintzer, and Leipzig (2006) in *The Impact of E-Learning in Medical Education* add another dimension to the research literature about e-learning in medical education. These authors discuss integration of ICT's as not only providing value to the student learning experience, but also opportunities for academic scholarship:

... studies in both the medical and nonmedical literature have consistently demonstrated that students are very satisfied with e-learning [furthermore,] students do not see e-learning as replacing traditional instructor-led training but as a complement to it, forming part of a blended-learning strategy [... whereas,] faculty development or promotion of scholarly pursuit [in the area of e-learning] is almost nonexistent to our knowledge; however, e-learning requires faculty competencies that go beyond traditional instructional activities. [Here lies the research opportunity ...] integration of e-learning into medical education can catalyze the shift toward applying adult learning theory, where educators will no longer serve mainly as distributors of content, but will become involved as facilitators (Ruiz et al., 2006, pp. 207, 209-210).

Given that healthcare education's adoption of technology is in the early stages of diffusion, research and scholarship of innovative teaching methods using ICT's is an evolving area.

Analysis of the literature indicates that pockets of early adopters utilizing ICT's exist in medical education. They are present and publishing articles regarding their use of digital communicative tools. White and Sharma (2012) in *Podcasting: A Technology, Not a Toy* comment that technology can be a tool to share educational material and provide content in a learning style alternative to the traditional method of medical education – the lecture. Forgie, Duff, and Ross (2013) in *Twelve Tips for Using Twitter as a Learning Tool in Medical Education* explore the potential of social media platforms as adjunctive tools in medical education. Their review of the literature on social networking platforms

in higher education led to “twelve tips” – a framework for medical educators to consider when adopting social ICT’s in medical education.

Wallace, Clark, and White (2012) in *‘It’s on my iPhone’: Attitudes to the Use of Mobile Computing Devices in Medical Education, a Mixed Methods Study* conducted an online survey and interviews to study how medical teachers and learners presently use mobile computing devices in healthcare education, and how they envision these devices will be used in future healthcare education practice. This study found both advantages and challenges with the use of mobile computing devices in medical education. These authors conclude that understanding how technologies such as mobile devices are adopted, and used in their context (education and practice) is important if educators and policy makers are to reap the benefits of the ICT’s of our era while avoiding their associated limitations. It is in published literature such as these articles that early adopters are sharing their insights. Understanding the “how and why” of the “early adopter” frame of reference can add to this discussion as we move forward incorporating ICT’s into healthcare education.

Literature regarding e-learning in medicine, and lessons learned exploring use among medical educators can be translated to other healthcare disciplines because of their similar learning contexts.

B. Discussion of e-learning in other areas of healthcare education

Literature specific to e-learning within dental education is not as prevalent, and does not date back as far as that found in medicine. I am uncertain why this is the case: this perceived imbalance could be a focus for future study. Moreover, it is this apparent

absence of e-educators in the dental field that was the spark for my research, as my professional background is rooted in the area of dental hygiene.

Much of the literature in the healthcare discipline of dental hygiene as it relates to e-learning has a focus on course delivery using solely web-based platforms to facilitate dispersed learning options. Although this does fit the definition of e-learning, it is a learning space separate from the traditional educational environment of undergraduate dental hygiene, dental, and medical studies because it does not blend traditional face-to-face instruction with ICT platforms. *E-learning vs. Classroom Instruction in Infection Control in a Dental Hygiene Program* (Garland, 2010) is one example of a research study in which content-based knowledge when tested, showed little difference in score outcomes in either delivery format. The focus of my research is directed at use of ICT in the traditional healthcare educational setting, a “brick and mortar” learning environment where new technologies are incorporated into mainstream teaching methods. Therefore, literature in this vein of inquiry has been reviewed and noted but, does not support my specific research line of inquiry and is not directly relevant.

The conclusions of a few articles within the dental education e-learning literature mirror the discussions in the medical education literature. Hillenburg et al. (2006) in their qualitative study of six US dental schools asked structured interview questions directed at deriving opinions regarding trends in the future role of IT in dental education. Similar to discussions in the medical education literature, the Hillenburg et al. (2006) study confirms a gap exists between what dental administrators/educators believe is the value of IT in educational process, and actual rate of adoption:

Digital technology will play an important role in the future of dental education. Factual-based didactic material lends itself well to computer-assisted learning, and the use of simulation widens students’ exposure to various clinical situations, and eventually the manipulation of virtual reality may even be used in the

development of skills that previously could only be gained by treating patients. ... The greatest challenge to increased adoption is the availability of financial resources (Hillenburg et al., 2006, p. 176).

These researchers see value in the use of ICT's in dental education, however they attributed the major barriers slowing adoption rates of ICT into educational practice to organizational elements such as costs and instructional design.

In contrast, DeBate et al. (2011) in *Factors for Increasing Adoption of E-courses Among Dental and Dental Hygiene Faculty Members* presented insights that deviate from the organizational barrier perspective, and approach this topic from the diffusion of innovations lens. These authors conducted eight 90-minute focus groups involving: three dental faculty groups with a total of twenty-seven participants; and five dental hygiene faculty groups with a total of twenty-three participants at six academic institutions. They explored characteristics of the E-courses, which could serve to increase or decrease adoption among educators. DeBate et al. (2011) found four main adoption barriers among faculty: low perceived advantage to IT use, low compatibility with curriculum, high perceived time commitment, and complexity of e-learning (pp. 592-594). These authors indicated that improving the fit between IT and its users is important to e-learning adoption, and training of faculty members may facilitate adoption. This exploratory research, although viewed through the same theoretical lens I will be using, is different from my focus. These researchers looked at perceived barriers in the e-learning affordances that interfere with IT adoption, or rather what Rogers (2003) refers to as “perceived attributes of innovations” (figure 6-1, p. 222). In contrast, I plan to study a sample of early IT adopters in medical education to explore their choice to use IT extensively in their practice, thus providing understanding into the “how” of the IT

adoption process. Rogers (2003) would view this as a “type of innovation-decision” (figure 6-1, p. 222), a variable influencing the rate individual adoption.

Early ICT adopters in disciplines such as dentistry and other allied health professions have presented their work in various research studies. Most relevant to the scope of this literature review is *Digital Animation versus Textbook in Teaching Plastic Surgery Techniques to Novice Learners* (Flores, DeMoss, Klene, Havlik & Tholpady, 2013). These researchers studied the use of digital animation to teach oral surgical skill development. In a randomized trial, Flores et al. found that the students learning technical skills with digital animation fared better than their textbook counterparts. These authors state: “this type of educational resource may greatly benefit trainees and practitioners who traditionally learn complex three-dimensional surgical concepts from a two-dimensional textbook” (Flores et al., 2013, p. 101e). Their conclusions were based on digital animation instruction introduced to solve a problem in their educational practice – fewer training opportunities for hands-on clinical learning that resulted in textbooks being the primary source of learning/preparation (Flores et al., 2013, pp. 106e-108e).

Linjawi (2010) in her doctoral dissertation, *Present and Future Challenges for E-learning in Dentistry* explored the attitudes of dental students and academic teachers at the University of Birmingham in the UK. This mixed-methods study (questionnaires, descriptive analysis of course materials, analysis of online discussion postings, one-to-one interviews, and focus group interviews) concluded: “E-learning has shown great potential in supporting change to dental education. There are differences between students and teachers. Students are enthusiastic in its use, whilst teachers have many concerns on its implementation related to work load and use of information” (p. ii). This research recognizes that today’s healthcare students – digital natives – may prefer to

incorporate their daily digital tools into their learning processes, and that e-learning is important to the knowledge transfer process in the student-instructor relationship.

Recently an online survey was distributed to the members of the Association of Schools of Allied Health Professions (ASAHP) by researchers exploring whether or how the latest instructional technology is being adopted by leaders/educators in fields such as physical therapy, and medical laboratory science (Butina, Brooks, Dominguez & Mahon, 2013). Seventeen years after Mooney and Bligh (1997) brought to our attention their opinion that “IT has the potential to revolutionize the way medicine is learned by students and healthcare professionals” (p. 701), Butina et al. (2013) echo the same sentiments in their findings: “results of this online survey indicate that most ASAHP members are not utilizing virtual reality learning environments in their programs ... educators need to recognize the potential application and benefits” (p. e9). Despite the fact that these research studies were conducted at different times with different technologies, slow adoption of IT was the norm in both.

C. General discussion of e-learning in education

The first two sections of this literature review focused on e-learning and ICT in the realm of healthcare education literature. This concluding section will highlight current e-learning research in mainstream education. Education in the healthcare disciplines differs from mainstream education because a large part of learning is situational in context, and often embedded in healthcare service delivery. However, mainstream educational practice can act as an adjunctive research base for insights into technology adoption for healthcare disciplines. Research and opinion-based literature in educational technology field is abundant and may serve as a resource for early adopters in healthcare education.

Much of the current literature in mainstream education focuses on blended education and learning. Blended education is a result of the diverse ICT's available to educators, and supports the trend in education to move away from solely face-to-face traditional teaching methods.

Blended education has been defined as:

... a course which makes use of physical classroom activities and synchronous/asynchronous learning activities; these are enabled through online and/or mobile technologies. These technology-driven activities aim to enhance learning through the integration of active learning approaches and/or extensive use of participant work experience. This implies that blended learning assigns different weights to different instructional methods (lecture, project work, case studies, practical assignments, etc.) allowing teachers to create courses with a variety of teaching and learning methods (Bohle Carbonell, Dailey-Hebert & Gijsselaers, 2013, p. 29).

The extensive body of literature on blended learning within general education is beyond the scope of this literature review. However, the work of Drysdale, Graham, Spring, and Halverson (2013) is particularly noteworthy. These researchers conducted a systematic review of thesis and dissertation trends on the topic of blended learning. Using the ProQuest database, the authors identified and analyzed 205 dissertations and theses to gain insight into the current state of blended learning trends. It is interesting to note, under the theme identified as “dispositions” which addressed sub-topics such as perceptions and attitudes, that faculty dispositions appeared to be under-researched, and that more research emphasis was placed on students in the blended learning environment (Drysdale et al., 2013, pp. 95-96). Although this study did not specifically look for early adopters of blended learning, “dispositions” of faculty could translate into “frames of reference”, hence highlighting that this type of qualitative exploratory research is under-represented in the literature.

Grgurovic (2014) in *An Application of the Diffusion of Innovations Theory to the Investigation of Blended Language Learning* reinforces that research inquiry in the emerging field of blended learning is suited to the theoretical lens of Diffusion of Innovations theory (Rogers, 2003). This study of blending learning in an English as a Second Language (ESL) program used Rogers' theoretical framework because the author had determined in her doctoral dissertation that blended learning in language course research lacked theoretical framing, and was often supported by previous research only. In this mixed methods study of ESL blended learning, the focus was directed at the "innovation-decision process" that adopters precede through in the diffusion process. The "innovation-decision process" is one of Rogers' theoretical unpinning's of Diffusions of Innovations, in addition to adopter categories/frames of references, and the attributes of the innovation itself. Two concluding statements by Grgurovic support my use of Diffusion of Innovation theory as an appropriate theoretical model for exploratory inquiry into early adopters of ICT in healthcare education: "First, the theory helped to provide the conceptual basis for the study because blended learning was a novelty in this context. Second, the theory directed the study of innovation toward three of its important aspects: (1) innovation qualities; (2) innovation-decision stages; and (3) categories of adopters" (Grgurovic, 2014, p. 168). Blended learning is novel in healthcare education and insights obtained from the early adopters are important to the future direction of healthcare education.

The discussions in mainstream education should resonate with healthcare educators, as students in the healthcare fields will be the professionals who are expected to practice their discipline in an arena that requires use of the most advanced technologies, both in healthcare service delivery and in communications with patients/colleagues on a daily

basis. Certainly the early adopters of technology in healthcare education are setting the stage to educate the most well rounded professionals of the future. Collins and Halverson (2009) in *Rethinking Education in the Age of Technology*, succinctly state the value of technology in the educational system:

To prepare students to communicate in the emerging world requires not simply the traditional reading and writing, but learning how to communicate using different media with people who do not share the same assumptions. Sometimes this means reading multimedia documents that come from different sources. Other times, this means communicating via the Internet in different contexts, such as design projects, negotiations, and problem solving. Internet communication may involve email, social network sites, chat rooms, video conferencing, and shared workspaces: Students need to learn to communicate in all these different contexts... (Collins & Halverson, 2009, p.13).

D. Summary of reviewed e-learning literature

A review of the e-learning literature reveals a common sentiment among researchers and educators – the use of ICT in educational practice is an evolving field. Adoption is slow, both in healthcare and mainstream education.

This literature review reveals that the seminal article in this subject area is that of Mooney and Bligh (1997), *Information Technology in Medical Education: Current and Future Applications*. The literature subsequent to this article consistently highlights that ICT use is slow to diffuse in healthcare education. Overall, the literature in healthcare education revealed two key findings – slow and varied adoption of ICT among educators; and the focus of research is on topics related to organizational elements of teaching practice (cost/implementation, ICT design, and other barriers of use).

Mooney and Bligh (1997) in their IT awareness study conducted in 1995 surveying 116 new medical students found: “92% of students use computers in their life - daily; 47% thought they would use computers as doctors; but, 25% of students used computers at school” (p. 701). This early study highlights salient issues seen in traditional healthcare

education – healthcare students expect to use the ICT of their era in their educational process. Thirteen years after Mooney and Bligh (1997) published their findings, Linjawi’s dissertation (2010) *Present and Future Challenges for E-learning in Dentistry* reveals that healthcare students view e-learning as important to the knowledge transfer process in their healthcare studies. A gap exists in healthcare education between the e-learning strategies that are utilized and what could be used. These authors highlight that the information technology of the era was not being used to its potential – adoption is slow and varied. Moreover, healthcare students expect to use e-learning technologies of their era (Mooney & Bligh, 1997; Linjawi, 2010).

Secondly, this literature review of research about e-learning in healthcare education found the majority of studies focused on the organizational elements of ICT use in healthcare instruction. The studies revealed a need to further investigate organizational elements such as: ICT design, ICT strategy implementation, and other perceived barriers to adoption as factors influencing the rate at which technology will diffuse into healthcare education. Ward et al. (2001), Hillenburg et al. (2006), and Kim (2006) state similar concerns regarding the use of ICT in medical education – it is not as pervasive in the student experience as it is in their daily life, where knowledge is transferred and shared on diverse digital platforms. These authors see the divide rooted in the structural elements of healthcare education’s organizational tradition. These authors conclude that educational programs in healthcare need to design strategies, evaluate IT effectiveness, and train educators in IT use to narrow the gap between how IT is currently being implemented and the level that would allow IT to reach its potential value in healthcare education.

Early adopters of ICT in healthcare education have published and shared in the research literature their use of innovative digital platforms in their teaching method. The iPhone (Wallace et al., 2012), Twitter (Forgie et al., 2013), and digital animation (Flores et al., 2013) are examples of the ICTs of this era discussed in the research literature. All these researchers found advantages and challenges with ICT use in their educational practice, and their published work has focused on organizational elements that maximize and/or challenge the potential of ICT use as adjuncts in healthcare education.

The literature in mainstream education referencing ICT use in teaching practice – blended learning – presents a similar picture to that reviewed in healthcare education. ICT use is an evolving field, and the research focus has primarily studied the organizational constructs of its use.

What has not been studied in the research literature is the early adopter, the actor or change agent in the diffusion process. Opinions within the literature indicated that the early adopter is an important influence within the organizational elements discussed. “Adopters and adoption” in *Diffusion of Innovations in Health Service Organizations: A Systematic Literature Review* (Greenhalgh et al., 2005) speaks to this gap in the health care literature:

Most accounts of diffusion have focused on the sources and nature of information about an innovation that are available to an actor. What has received much less attention in diffusion research is the actor, per se, as an important contributor to the diffusion process (p.100). ... The widely cited lists of adopter characteristics have been rarely empirically tested in prospective studies outside the commercial market. We found no prospective studies of hypothesized characteristics of adopter categories in the organizational setting. Arguably, many of these categories are little more than the result of deterministic research design (p.102).

These authors value the importance of research investigating the actor in the diffusion process, however they infer that characteristics of the actor may not be meaningful, if they are a function of the research design. Their caution was carefully considered during

the data analysis process of this research project. Interview question methodology should be mindful not to categorize the study participant in the data collection interview; instead, it should seek to draw characteristics or frames of reference per se.

Having reviewed the literature in the fields of medicine, dentistry, dental hygiene, and allied health professions, my research question: How are e-learning technologies currently utilized extensively in teaching practice by medical educators in traditional healthcare education who could be viewed as “early adopters?” and its associated findings will fill a recognized gap and add a different dimension within the current research about e-learning and healthcare education. It is hoped that these qualitative data findings from early adopters of IT in educational practice will provide an additional piece of puzzle to aid in minimizing the challenges that healthcare educators face today, as frames of reference or characteristics of early adopters may be a part of the equation.

Perhaps, the questions of “whether” or “how” in technology adoption are not sufficient. My exploratory study of early adopters has already answered the question of “whether” via the participant’s inclusion status as an early adopter. In addition to “how”, the questions of “why” that I have explored may add insight to healthcare education’s slow climb up the IT diffusion of innovations curve.

III. Research Design and Methodology

This research project is an exploratory study seeking insight into “how” and “why” early adopters of IT use the tools of e-learning in their teaching practice. Given that use of IT in healthcare education as discussed in the literature is in the early stage of diffusion, and very little inquiry has focused on individuals who choose to incorporate e-learning tools early into their practice, foundational exploratory work on the topic is lacking and needs to be done. As explained by Singleton and Straits (2010), “exploratory studies are undertaken when relatively little is known about something, perhaps because of its ‘deviant’ character or its newness” (p. 107). Exploratory inquiry as a research design lends itself to discovery and insight. In this research project, an exploratory research design was used in the hope that the “actor” – the early adopters of IT within healthcare education – could provide a frame of reference for the “how” and “why” of their IT use, and that this frame of reference could inform IT adoption in traditional healthcare education and/or provide a foundation for future research in the area.

Qualitative methodology is well suited to exploratory research design (Walliman, 2005, p. 21). In this applied research project that sought to evaluate if qualities or frames of reference are evidenced in recurring themes among the study participants, qualitative inquiry provided rich data that would not have been identified using quantitative methods. Qualitative study seeks to find meaning in the context in which the phenomena occur – “the meanings and understandings which the people involved have” (Miller & Brewer, 2003, p. 193). Hence, the individual early adopters of IT in healthcare education provided insights regarding frames of reference that could not be extrapolated from the

generalizations discussed in Rogers (2003) Diffusion of Innovations theory or in the arena of IT adoption in mainstream education, as neither are context specific to healthcare education.

A. Research population and recruitment design

As discussed, IT use is not widespread, nor standardized in traditional healthcare education. “The exploratory phase [of research] helps researchers begin to understand the points of view of actors in the setting, identify worthy research questions, articulate and operationalize variables of interest, and allow theory to emerge” (Palys, 1997, p. 79). Therefore, as is appropriate for exploratory research, a small purposely-selected strategic sample of healthcare educators was selected from whom to gather data (Palys, 1997, p. 79).

In this study, I interviewed and collected data from six participants who used IT in their teaching practice from six different healthcare programs. Participants at the University of Alberta from medicine, dentistry, dental hygiene, physical therapy, occupational therapy, and medical microbiology & immunology were the population purposely recruited. A diverse sample from different departments was chosen to bring insights and information from various perspectives, and to reflect the “actor” per se as discussed by Rogers (2003).

Early adopters of technology in their teaching practice were identified utilizing the technique of content analysis. According to Prasad (2008) in *Content analysis: A Method in Social Science Research*, this methodology is a useful technique to “relate known characteristics of sources to the messages they produce” when the purpose of the analysis is to seek descriptive characteristics from content (p. 176). The University of Alberta and

their associated departments make websites available in the public domain that provide written content on healthcare educators. Within these websites, healthcare educators indicate areas of teaching expertise, research interests, etc. The content on these public websites was searched to identify healthcare educators who are using IT in innovative ways to educate the students in their respective healthcare programs. Within these websites, textual references were found indicating the use of digital platforms in teaching methodology that included phrases such as: “e-learning”, “computer-assisted learning”, “video conferencing technology”, “asynchronous multi-player game system”, and “podcasting/video casting”. A purposive selection of participants was derived from this textual information indicating IT is a part of their educational practice – “purposive samples intentionally focus on the target group to the exclusion of other groups” (Smith, 1988, p. 85). Further, this method of sampling “lets you access just the right people or texts for your study when you do not have the sample frame that would be required to use stratified random sampling” (Merrigan et al., 2012, p. 66).

Cover letters were sent to eight potential participants at the email address publicly listed as their contact address, to introduce my study and provide the details of the research project, ask them for their participation, and provide them with researcher contact information for follow-up as required. Six of the eight study invitees from six different healthcare departments responded.

Participation in this research project was voluntary and conducted in compliance with the University of Alberta’s ethical standards and with Research Ethics Board (REB) approval. (See - Appendix 1: Invitation letter to study participants; Appendix 2: Information letter to study participants; Appendix 3: Study consent form; and Appendix 5: REB project approval letter).

B. Study design

A qualitative approach using semi-structured interview methodology was used to explore the early adopter of IT in the context of healthcare education. Brazeley (2013) in *Qualitative Data Analysis* indicates that this method of research with a focus on “observing, describing, interpreting, and analyzing the way that people experience, act on, or think about themselves and the world around them [may] lead to serendipitous findings and new integrations [that] go beyond initial conceptions and generate or revise conceptual frameworks” (p. 4). Rogers (2003) generalizes about early adopters in his theory of Diffusion of Innovations, however, these constructs have been conceptualized and constructed based on research that looks *retrospectively* on the actor once the innovation has run the cycle of adoption within the social structure in which it is embedded. Qualitative study of early adopters asking “how” and “why” the individual uses IT healthcare education – at the stage when mainstream adoption has not yet reached its tipping point – can add insight to existing knowledge in the area of diffusion study.

The semi-structured interview format was chosen as it allows the participants and the researcher the opportunity to clarify and expand on interview questions as appropriate within the scope of inquiry. Interviews with healthcare educators were conducted in face-to-face format (including one Skype video-conferencing interview requested by a study participant). A face-to-face interview provides a depth and richness to the data collected, an important consideration given the small sample size of this exploratory study.

Questions were formulated and grouped into four segments. The four areas or frames of reference included in the interview schedule were as follows:

- Demographic/background information.

- Prior history with digital technology/tools.
- E-learning as used in the participants current educational practice.
- Perceptions regarding use of e-learning/digital technology.

(Appendix 4: Study interview script)

Data was collected over a four-month time span from May 2013 to August 2013. This time frame appears lengthy for conducting six interviews. However, it is important to note that the study participants are individuals at the forefront of their teaching practice/professional disciplines, and this characteristic required flexibility by the researcher to accommodate their tight schedules that included international speaking engagements and research activities. Gillham (2005) states that the “elite interview” is distinctive and a source of rich information:

In short, it involves talking to people who are especially knowledgeable about a particular area of research or about the context within which you are searching. They are commonly in positions of authority or power by virtue of their experience and understanding. Such people are likely to be sophisticated subjects for interviewing. Not only do they know more than the researcher about key dimensions of the area but will be alert to the implications of the questions, and of their answers to them” (p. 54).

The characteristics described by Gillham were indeed exhibited by the highly successful participants in this research study. For example, one participant would precede the answer to some questions with “that is a good question” or “that is an interesting question”, and on one occasion stated, “I disagree with the premise of your question” prior to answering.

All interviews were audiotaped and transcribed verbatim to accurately reflect the participants’ insights and experiences with early adoption of IT in their educational practice. Transcripts were identified for data analysis in order of interview date, first to

last (1 to 6). Transcripts masked any identifying names or identifying text that would compromise participants' confidentiality.

Coding of data collected in the interview transcripts involved looking for recurring themes – patterns or trends evidenced in the text transcribed from the interviews.

“The term ‘theme’ is used to describe an integrating, relational statement derived from the data that identifies both content and meaning. ... A theme is an outcome of categorization and analytic reflection [which] aims to work out the relationships between categories, and the significance of such relationships for the development of theoretical conceptions and statements” (Brazeley, 2013, pp.190-191).

Recurring themes were used to form the basis for analysis to determine if common frames of reference or characteristics emerged among the sample population. Analysis of themes was guided by Rogers (2003) “innovativeness and adopter categories” (pp. 267-299).

According to Creswell (2003), qualitative semi-structured interview design and methodology innately lends itself to inquiry that assumes reality is discoverable and separate from perceptions (p.184). Therefore, as a researcher I needed to suspend any experiential bias, perceptions, or insights derived from working in a professional field similar to the research area of study. Creswell (2003) refers to this type of research as “backyard” research where the topic of study involves the researcher’s own organization or immediate work setting, and advises that the researchers need to “bracket” their “own experiences in order to understand those of the participants in the study” (Creswell, 2003, p. 15). Paradoxically, it was insights based on anecdotal information and informal observation, that led me to consider the notion that early adopters may hold some unique characteristics or frames of reference that could translate into understanding how and why the diffusion process proceeds.

C. Study Limitations

Limitations of this exploratory study include the sample size and the inclusion of participants from just one organization – University of Alberta. These limitations were necessary given the time and financial constraints inherent within the academic requirements of the MACT capstone project.

Small sample size, and participant selection from one organization using face-to-face, in depth-interviews is necessary for exploratory research. However these are limiting factors, which make impossible the extrapolation of these study results as representative of all early adopters of technology in healthcare education.

IV. Findings

This section will provide an overview of the study participants. It will then present the emergent themes from the data collected in the six interviews with early adopters of ICT in healthcare education. From these emergent themes, two frames of reference have been identified among these educators – risk-takers, and problem solvers.

A. Overview of study participants

This study involved interviews with and collected data from six participants using ICT in their teaching practice from six different healthcare departments at the University of Alberta. Participants included healthcare professionals and educators from the disciplines of dentistry, dental hygiene, medical microbiology & immunology, occupational therapy, physical therapy, and surgery. Study participants included four females and two males ranging in age from 44 to 71 years. These six individuals collectively provided insights from 132 years teaching experience.

Participant	Gender/Age	Healthcare discipline	Years of teaching experience
1	Female/54 years	Dental Hygiene	15 (last 5 with ICT)
2	Female/54 years	Physical Therapy	20 (last 7 with ICT)
3	Male/53 years	Dentistry	18 (last 7 with ICT)
4	Female/60years	Medical Microbiology & Immunology	10 (last 9 with ICT)
5	Male/44 years	Surgery	20 (last 5 with ICT)
6	Female/71 years	Occupational Therapy	46 (last 12 with ICT)

Table 1: Participant Demographics

As can be seen from the data in Table 1, these individuals are seasoned educators and early adopters of ICT in their teaching method. And as revealed on their public websites and during interviews, they also:

- Are life long learners holding advanced degrees in areas beyond their clinical specialties, such as graduate degrees in public health, education, communications and technology, and research.
- Have, or hold administrative positions within their respective departments such as department chair and/or academic chair, and faculty service officer.
- Have, or are involved in development of educational programs beyond the physical borders of the teaching institution in which they work (University of Alberta).
- Have received national teaching awards, endowed chair positions, and teaching & leadership award recognitions from their university and/or their professional organizations.
- Present their work at conferences nationally and internationally.
- Have developed ICT teaching tools that include multiplayer game learning systems, podcast application series, and computer assisted clinical reasoning tools (not all participants).

All study participants are highly accomplished in their respective fields. They are busy and very multi-talented individuals, but were surprisingly quite humble in how they viewed themselves. When asked the question – *How do you view yourself/or your role as an educator adopting new IT tools and methods in healthcare education?* – one participant responded:

I guess in a way I haven't really thought of myself as one of the innovators. I'm pretty sure I am not. I'd say, more of an early committal kind of adopter on some things ... I guess I would say I'm willing to move on some of these things earlier than some have, or than maybe the majority have.

This type of response/perception indicating a wavering commitment to describing oneself as an early adopter infers personal humility, and was present in some way within all participants’ comments.

B. Emergent Themes

Textual analysis of transcribed interviews identified six reoccurring themes within the data. They are as follows:

Emergent Themes	Number of participants for whom theme was identified in textual data
Participant did not view himself or herself as “techie”.	5 of 6 participants
Barriers are not obstacles to ICT adoption for participant.	6 of 6 participants
Participants hold the belief that they have support of their organization and/or peers.	6 of 6 participants
Participant indicates that they started to use technology as a result of opportunity or need to solve a problem.	5 of 6 participants
Participants are lifelong learners.	6 of 6 participants
Participants are reflective thinkers.	6 of 6 participants

Table 2: Emergent Themes Identified

1. I am not a “techie” person

According to the Merriam-Webster Dictionary (2014), the noun “techie” is defined as “someone who knows a lot about technology”. Palfrey and Gasser (2008) refer to this trait as “digital literacy: the ability to use the Internet and other digital tools effectively” (p. 352).

Five of the six participants in this study either stated explicitly that they were not a “techie”, or discussed their experiences teaching with technology as an evolving process that embraces the acquisition of new digital literacies. Although these five participants all regularly used various information technologies professionally and personally without hesitation, these behaviors did not translate into their own perception of the technological savvy “techie” stereotype. Statements such as the quote below highlight the theme that diverse and/or effective digital literacies are not prerequisites for adoption of ICT, and that technical abilities evolve when the individual embraces the idea of technology use in the traditional educational setting:

I am not a techie kind of person, at all. I mean, I can use a few things, ... and even our ed technology person was not hired as that ... she is just such a well-rounded, interesting person.

Moreover, a crucial aspect of the information within this theme is the fact that four of the five educators who did not view themselves as “techie” also rejected the idea that only a professionally produced teaching tool could meet the standard necessary for effective IT instruction. One educator discussed the use of video-casts in clinical assessments when providing content for students to learn and review “demo” procedures outside of the laboratory:

I thought, why are we not videotaping more of what we do? Well, the home movies! You know, I think we were worried too, about everything that we ever posted had to be some kind of perfectly published textbook, professionally produced video. Students love home movies.

Embracing the notion that ICT use in the traditional classroom can be self-managed and still be effective appears to be an idea common among these early adopters of technology. Technical expertise is helpful, but not necessary. Believing that technical skill does not require perfection appears to be an important notion that prompts and supports the “not techie” healthcare educator to try new platforms.

2. Barriers to ICT use are not barriers to adoption

All study participants discussed barriers to ICT use in the traditional healthcare setting. The most frequently discussed barriers were: lack of dedicated time available to learn new technologies, lack of funding for professional development in the area of educational technology, and lack of organizational money to support new technologies.

One study participant discussed the competing time demands of teaching, research, and maintaining a clinical presence while at the same time incorporating innovative teaching methodology:

It's the time to develop your teaching tools and to really spend to be a good teacher. This is what I find most limiting about work here at the university. That's why I came here, but with administration and research and other things that you're *expected* to do, your ability just to think about your teaching and reflect on it and plan is often quite limited. And that's my biggest challenge.

This challenge of time constraints was a sentiment held by all study participants, however despite these concerns, they all have found the time in their schedules to adopt new ICTs into their teaching practice.

The interview data revealed that lack of funding to initiate the use of new ICT into their teaching practice also did not serve as a barrier for participants to adopt new technology into teaching practice. Overall, the participants found a way to incorporate new teaching technologies regardless of budget constraints imposed on attending courses to learn about the technology, or on the technology itself:

I think initially, a number of things weren't introduced *because* of budget. When we first wanted to do a video it would have entailed getting somebody to do it for us ... there wasn't money for that. Now when the technology is such that you can just do it yourself, it doesn't matter.

The participant quoted above has found a way to integrate at least one new relevant technology-based learning tool over the past five years teaching the course, regardless of existing barriers.

Another early adopter discussed how their own ICT learning needs were met in the absence of professional development funding:

There are no resources set aside for that. We are encouraged to [take a course], but only as long as it's within the university environment, and at no cost.

Although lack of time and lack of funding to learn about ICT were the most frequently discussed barriers to adoption, all of these ICT users found ways to learn about how to leverage emerging trends and opportunities in educational technology, either from within the larger organizational environment, or from online resources.

3. Participants believe that their organization and peers support their ICT use

All six of the study participants discussed how they felt supported by their organizational departments and their peers in their use of technology in the classroom.

Discussion of this support included different types of assistance or encouragement, and sometimes participants' initial comments appeared to be contradictory. Four of the six participants indicated that dedicated financial support from their respective departments for the inclusion of innovative technologies was minimal or absent, for example one participant stated: "We're working on some grant funding, no permanent funding yet". However, adopters did not perceive this generalized lack of dedicated financial support as an indication that their use of innovative ICT was less important than other teaching strategies supported by the organization.

All six participants noted collegial recognition of their innovative teaching methods, even when later statements in the interview contradicted earlier comments that their peers had actually taken an active interest in their use of technology in a positive manner. The following statement highlights the belief of peer support, even in the absence of their peers actually knowing what the innovative teaching methodology was:

Very supportive [colleagues]. I don't think they *actually* know that I use the interactive technology. I mean, I talk about it but you know all of us use something or other.

Another educator indicated that peer support was present in her department, however the statement was made in an observational context, and contingent on how effective the ICT was in practice:

I'm probably seen a little bit as a guinea pig. So I try it first and if it works, then some of them will use what I've been using. You always need to have people that are willing to take a little chance and try something before other people are sure that it's something that's going to work, because they don't want to spend the time or the energy on doing something that they're not sure of the value of. So I guess I'm kind of like a test pilot. ... That being said, I've had very good experiences with the e-learning people because I've taken that initiative, right? But other people don't even know about e-learning.

In this educator's department, the perception of peer support was dependent on the outcome of the innovative teaching tool being tested, rather than unconditional support for trying out new teaching methods. Whether this type of peer support contingent on outcome actually supports the innovative endeavour can be questionable, however this early adopter felt supported in this "guinea pig" role.

Within this group of early adopters of ICT, the belief that their peers and their organization support them was important. Whether or not the support was concretely demonstrated in financial or active collegial engagement for their teaching endeavours, these educators fundamentally believed that they worked within supportive environments that allowed them to pursue the merits of adopting innovative teaching technology.

4. Participant "fell into" ICT use due to an opportunity or to solve a problem

In this study, five of the six early adopters of ICT in healthcare education incorporated e-learning into their teaching practice as a result of an opportunity to work with technology, or from a perceived need to solve a problem in their teaching practice.

Three of the study participants were presented with teaching opportunities that required ICT use in some capacity, hence the phrase “fell into” was articulated. These three healthcare educators were involved in courses that piloted e-learning technologies as their departments ventured into the arena of dispersed learning environments for students. One participant discussed how her first “formalized foray into e-learning” occurred as a result of an opportunity to develop and pilot an online course that mirrored the same course that was taught in a traditional classroom setting:

It wasn't something I would have sought out, because I didn't see myself in that role. . . . I really was a reluctant participant initially. It was something I fell into. I was provided with an opportunity and once I started in it, I found that I really had a passion.

Another study participant stated: “I’m not usually the first one to take up technology or anything . . . it was something *I fell into*”. I was provided with an opportunity and once I started in it, I found I enjoyed it”. This study found that these early adopters of ICT in their teaching practice seized opportunities that are presented to them. It is one thing to have opportunities presented to you however, it is quite different to take that opportunity and have the interest, and energy to make the extra effort to take advantage of it.

The other two study participants indicated that their interest in using ICT’s in the teaching process was a result of a perceived problem. One healthcare educator said that when she first began her teaching career, she found the course material difficult, and the volume heavy for the students, so she incorporated technology to make the course more engaging and manageable:

My courses are pretty heavy, fact-based, you know – heavy courses, and just to make learning more fun, more interesting, more impelling, I’ve been using e-learning tools.

Another study participant “fell into technology use” to address a personal problem. She observed a family member with reading disability who benefited from gaming

technology, and subsequently reinvented/incorporated these tools into her teaching practice:

It was recognizing how they were thinking and strategizing in this Dungeons and Dragons game room, with similarities with how therapists thought. And then I happened to find, you know in this situation, that I'd got a problem here. I need to create experiences where our students can deal with and be exposed to *clinical* phenomena – it doesn't have to be physical, because I can't access it ... so I went from the *Dungeons and Dragons* of my own experience ... to game building.

5. Lifelong learning

All of the study participants were lifelong learners. Five of the six participants hold advanced degrees beyond what is necessary for them to practice professionally in their respective healthcare disciplines, and as subject matter experts in health education. All six participants discussed how they learnt about new ICT's that they have introduced into their teaching practice. Formal learning was obtained by attending workshops or conferences. In addition, three study participants had the opportunity to work and learn from an educational designer. One participant used the services of an educational designer when creating an entirely new course, while the other two used a designer to help them create a new ICT tools specific to a course they taught (gamification; and a computer-assisted reasoning tool).

In all cases, informal learning was self-initiated, and typically involved using online resources to find information about a tool that they had heard of:

I seek out continuous learning not just in my discipline but as an educator. ... There isn't a lot of crossover from general education sometimes into what we do here, and that I find frustrating. But so, you know, I had heard about it [referring to a specific ICT] and my [spouse] said, hey you should look at that. So that was self-learned. I haven't had any course on it, I just went to the website and took some tutorials, and just played around with it.

One participant stated that business literature relating to software was their preferred literature to learn about emerging technology applicable for inclusion into their teaching

practice: “I find them from the business literature. I read the *Higher Chronicles* [*The Chronicle of Higher Education*] later”.

These study participants highlight that lifelong learning is a practice that draws from a wide array of information and knowledge resources.

6. Reflective thinkers

Reflective thinking is part of a process that helps individuals apply new knowledge in their day-to-day activities via the incorporation of new knowledge into prior knowledge, and the ability to apply specific strategies in novel tasks (Reflective Thinking, n.d.).

When asked the interview questions regarding the use of IT in their teaching practice, and how they determined when to use IT in their courses, all six of the participants were reflective in their responses, indicating that the participants were thoughtful and insightful about their teaching practice. The thread that ran through all participant responses as they reflected on their use of IT was the *relevance* of the technology in enhancing the student learning experience.

One early adopter of technology stated that computer assisted technology facilitated the transformation of a traditional classroom into an interactive space that promoted learning more similar to the context of a clinic experience for the learners:

It's this in-situ learning that I think we need to somehow capture and be interactive. It's the interactive part I want in the e-learning, not this static crap.

Another educator found the adoption of video conferencing technology had facilitated learners' access to experts in dispersed locations. With this technology, experts in specific clinic fields are virtually present to share information and knowledge with students when needed in real-time, allowing relevant and timely knowledge acquisition:

We've used this video communication technology to make people feel at ease, so I don't have to know *everything* about everything. If it's a question from a student that really is just too technical for me ... we'll ask [an expert] that. So I text [the expert], and she'll either phone, or do the video conferencing, or Skype, or whatever.

Technology has allowed this educator to provide students with access to the experts in real-time, allowing the teachable moments to be relevant.

Adoption of technology by these healthcare educators was consistently guided by reflective thought processes – “I strongly believe in creating relevance in the material for the students. You know, so if the technology allows me to create a more relevant or real situation for them around the information, then that would be contributory” (Interview). Use of ICT, or choice of platform was not determined by the latest technological trends, but driven by the individual’s reflective thoughts on what value a specific tool could add to the student learning experience.

C. Summary of findings

Analysis of the interview data revealed that the following emergent themes could be strongly associated with all six of the participants in this study:

Emergent Themes
Barriers are not obstacles to ICT adoption for participant.
Participants hold the belief that they have support of their organization and/or peers.
Participants are lifelong learners.
Participants are reflective thinkers.

In addition, analysis of the interview data revealed that the following emergent themes could be strongly associated with five of the six participants in this study:

Emergent Themes
Participant did not view himself or herself as “techie”.
Participant indicates that they “fell into use of technology” as a result of opportunity or need to solve a problem.

One participant did identify himself as “techie”, and this was the same individual who did not inadvertently enter into the practice of teaching with technology.

Demographically this individual was the youngest of the participants interviewed, so he was introduced to technology much earlier than the other study participants. Introduction to technology in this participant’s youth had created a sense that technology was a part of every day life.

1. Proposed frames of reference

From these emergent themes, two frames of references have been proposed: risk-takers, and problem solvers. This will be discussed in the section that follows.

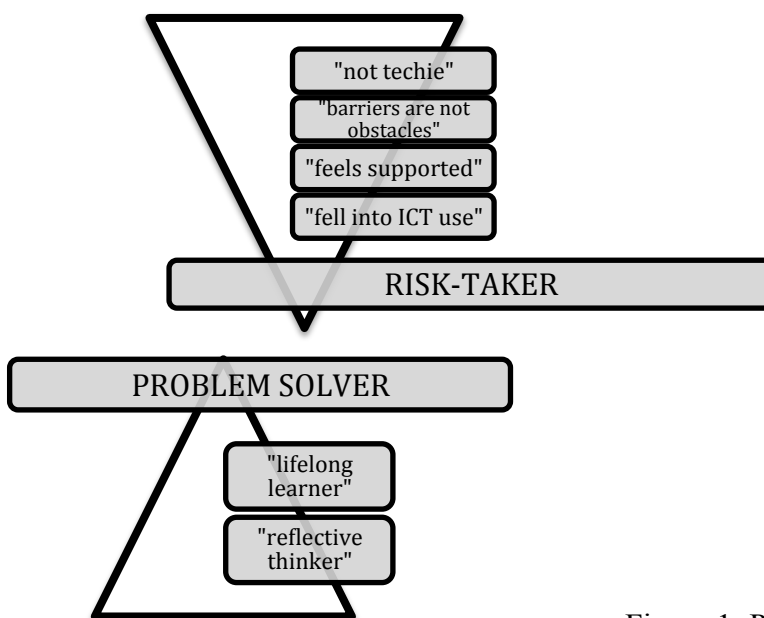


Figure 1: Proposed frames of reference

a. The “risk-taker”

In the entrepreneurial sense, the early adopters in this study approached the use of ICT from a risk-taking reference point. In *Using Cognitive Theory to Explain Entrepreneurial Risk-Taking: Challenging Conventional Wisdom* (1995), Palich and Bagby paint a picture of risk-takers, who are:

- Individuals who use their own judgment when faced with uncertainty.
- Innovators who create new combinations by introducing new processes.
- Individuals who quickly recognize opportunity.
- Individuals who focus on favorable outcomes, which are reflected in their perceptions (pp. 426-427).

All six participants exhibited some if not all of the above characteristics.

For example, one participant who did not identify as “techie”, nor envision a professional career that utilized ICT, recognized that video-casts used to create teachable moments did not need to be professionally produced to add value for students.

Introducing what was referred to as “home videos” was the beginning for this participant of creating new learning processes via technology without dedicated funding. This same individual also combined the use of mobile technology – text messaging and Skype – to provide real-time student access to subject matter experts when in dispersed locations.

All these combined communication technologies created learning opportunities where lack of funding was not a barrier because these innovative teaching methodologies remained “in-house”, and used technology that was readily accessible. This risk taking individual focused on the opportunities that low cost communication technologies could bring to the student experience, and was not deterred by the pervasive notion that students require professionally created resources to add value to the learning experience. This early adopter took the risk that combining these innovative methods (home videos,

and mobile technology applications: text messaging and Skype) would be well received in the traditional constructs of healthcare education – both by students and peers.

b. The “problem solver”

In essence, solving a problem focuses on closing the gap between “what is and what is desired”. Problem solving is a complex process: “a knowledge base” and “reflective thinking” are two of the vast array of competencies required of problem solvers (Huitt, 1992).

Life long learning is the cornerstone of an individual’s knowledge base. All study participants stated they engage in both formal and informal learning to keep abreast of existing and emerging ICTs.

When study participants were asked the interview question: “How do you determine when to use IT in your teaching practice?” – “relevance” of the technology used to achieve the desired outcome of the learning objective was stated by all educators as the guiding principle for IT inclusion. Technology was not being used in their teaching methodology for technology’s sake: it was used because it solved a problem and because it was an appropriate method for the learning task.

Interview data from these particular six early adopters of ICT in healthcare education revealed six major themes, which translate into two frames of reference that guide their technology use in teaching practice – risk-taking and problem solving.

V. Discussion

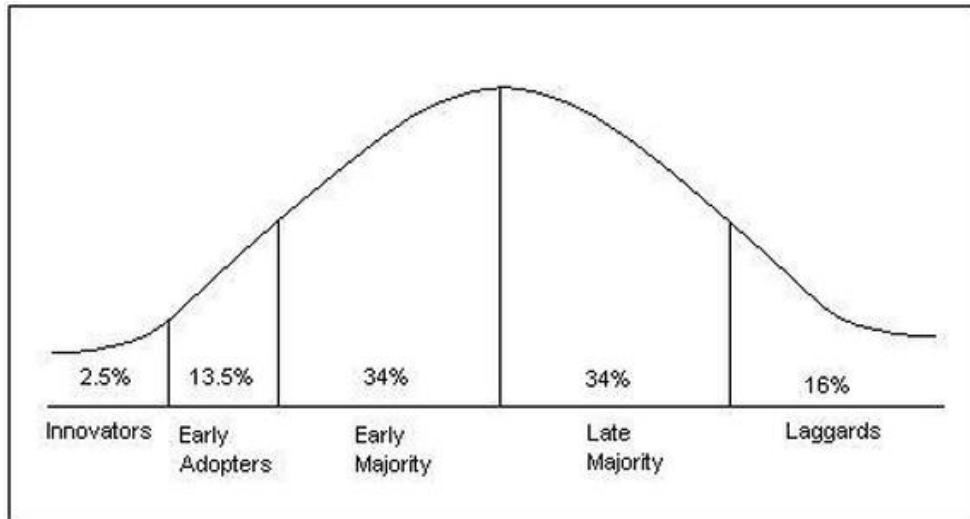
E-learning, the incorporation of ICT into traditional healthcare teaching methodology is in its infancy. Diffusion of Innovations theory (Rogers, 2003) indicates that the adoption of a new idea/method is difficult, even if that idea/method is at the forefront of a group's consciousness. This study's literature review revealed that this holds true for healthcare educators: discussions indicating the need to incorporate ICT into healthcare instruction date back to 1997, but ICT use remains varied and is still evolving (Mooney & Bligh, 1997; Butina et al., 2013).

Early adopters are a critical element in the diffusion process. However, the conceptual model that frames the Diffusion of Innovations theory was derived from retrospective insights within the discipline of agriculture. Although this theory can provide a framework for the adoption process, it may not be sufficient to characterize those in healthcare educational institutions striving to adopt ICT into their teaching methodologies. This exploratory study looked specifically at healthcare educators at the University of Alberta utilizing ICT in their teaching method, and found two additional frames of reference that guided their adoption – risk-taking and problem solving.

A. Exploratory research of early adopters is important to the organization

Rogers (2003) highlights that the early adopter is essential to the diffusion process. Early adopters are the “agents of change” – the “influencers” in a community/organization incorporating new ideas/methods of the future (Rogers, 2003). His standardized distribution curve for the diffusion of an innovation over time indicates

early adopters represent only 13.5% of the community once the new idea/method has been incorporated to its full potential in the community's social/organizational structure (Rogers, 2003, p. 281).



During the recruitment phase of this exploratory study, only eight potential participants from the healthcare disciplines at the University of Alberta were easily identified as early adopters of ICT from websites in the public domain. This is not to say that other early adopters of ICT in healthcare education at the University of Alberta do not exist, only that few were identifiable. The recruitment phase of this study perhaps affirms that early adopters represent a small and distinct group in the diffusion process within a community/organization.

Understanding and identifying early adopters is important to the diffusion process and the organization since they are few in number, and not always easily recognizable. The frames of reference I have found associated with this study's early adopters of ICT in healthcare education – risk taking and problem solving – present specific generalizations that could draw attention to other healthcare educators in the organization who may not

publicly discuss their use of technology in their teaching method, but are known for taking risks or/and solving problems in their roles as educators. This can be important in two ways for organizations seeking to implement educational technology in their curricula.

First, knowing about the number of educational technology adopters can paint a clearer picture of the current state of the diffusion process for the organization. For example, the study participant who stated: “I don't think they *actually* know that I use the interactive technology. I mean, I talk about it but, you know, all of us use something or other”, indicates that the organization itself may not have a clear understanding of the status of their ICT uptake among faculty. Without this knowledge it is difficult for organizations to develop strategies that encourage the diffusion of ICT into their curriculum because, the prevailing picture of teaching methods utilized, or the number of early adopters may not be accurate. It is difficult for organizations to move forward in an endeavour, if you do not clearly know your present state.

Second, knowing who the early adopters are can allow the organization to leverage their potential to influence other adopters who may be uncertain about educational technology. The importance of identifying the early adopters to leverage their influence in the organization is highlighted by one study participant who indicated that they were the department's educational technology *guinea pig* – “I try it first and if it works, then some of them will use what I've been using. You always need to have people that are willing to take a little chance and try something before other people are sure that it's something that's going to work”. This individual's known status as an early adopter, and her innovative teaching methods, can influence others considering adoption because she can provide information and experiential knowledge that may minimize the challenges

other healthcare educators face when adopting ICT. Moreover, the organization can promote curricular change in a bottom-up process when peers and colleagues influence the adoption process.

In essence, understanding the early adopter allows the organization to leverage the experiences of the early adopter to promote change in attitudes, expectations, and behaviours surrounding the use of ICT in healthcare education amongst their faculty members. The study participant who discussed her successful use of *home videos* to engage student learning is an example of an early adopter who could influence attitudes, expectations, and behaviours surrounding the prevailing notion that ICT incorporation into teaching practice requires professional development and design for success.

B. Rogers' early adopter characteristics versus proposed frames of reference

Diffusion of Innovations theory presents a continuum of twenty-four idealized generalizations about early adopters of innovations (listed on page 24 of this study). These generalizations have been derived retrospectively and explain the characteristics of early adopters through a universal process “lens”. Perhaps this is why many of these characteristics can hold true for any individual “trying something new and novel” from the onset of its use. Therefore, trying something new and novel does not necessarily translate into a being an early adopter.

Although Rogers (2003) general characteristics provide understanding about adopter categories, this is not always sufficient when seeking to understand the early adopter mindset prior to the widespread adoption of an innovation. General characteristics do not adequately explain “how” or “why”. The frames of reference revealed in this study of early adopters of ICT in healthcare education appear to align more succinctly with the

questions of “how” and “why” early adopters chose to use innovative technologies. The “how” can be inferred in the risk-taker frame of reference, whereas the “why” aligns with the problem solver frame of reference. Just as Rogers’s theory of Diffusion of Innovations generalizes who the early adopters are, these proposed frames of reference do the same. Hence, inferences from this small study cannot be extrapolated to early adopters in general, nor early adopters of ICT in other educational settings. Rather, these frames of reference can only provide additional insight into the existing understanding of early adopters of ICT in healthcare education.

Rogers’ generalizations of early adopters, and this study’s frames of reference of early adopters of ICT in healthcare are not mutually exclusive. Rather, they are complementary – providing insight into behaviors of early adopters in this specific context. Further research is needed to confirm whether these frames of reference can be found in healthcare educators at other organizations, or among educators in general.

C. Are Rogers’s generalizations sufficient in understanding early adopters?

Greenhalgh et al. (2005) state that Rogers’s adopter categories are: “simplistic and terms that are widely misapplied as explanatory variables” (p. 100). This study, however, found commonalities in frames of reference that guide early adoption of an innovation, providing variables that are more succinct. The data revealed six emergent themes among healthcare educators at the University of Alberta who are using technology. The themes are:

- I am not a “techie” person.
- Barriers to ICT use are not barriers to adoption.
- Participants believe that their organization and peers support their ICT use.
- Participant “fell into” ICT use due to an opportunity or to solve a problem.
- Lifelong learners.

- Reflective thinkers.

From these themes, I have proposed that these early adopters of technology in their teaching method incorporate new ideas/innovations because they are risk-takers and problem solvers.

This study revealed that opportunity, and the perception of support underlies the risk-taking frame of reference that may promote innovative teaching methodologies among healthcare educators. Healthcare programs planning to integrate innovative teaching technologies into their curriculum need to provide opportunity and support to faculty members if they are to encourage educators to take on challenging problems and risky endeavors in their teaching methods.

D. Frames of reference and the adoption process

Adoption of something “new and novel” is a process. Rogers (2003) refers to this as “the innovation-decision” process, where the decision to incorporate the innovation passes through a five-step process: “knowledge, persuasion, decision, implementation, and confirmation” (pp. 20-22).

In this study of early adopters, the data collected in the interview questions did not indicate that the decision process of the participants included all five steps that Rogers’ Diffusion of Innovation theory ascribes to. All of these study participants discussed how they obtained the knowledge to implement the innovative ICT (knowledge), why they utilized the ICT (decision), and how they used the ICT (implementation). Persuasion, and/or confirmation regarding the value of the ICT to teaching methodology was not expressed by this study’s participants as part of the equation in their adoption process. All these healthcare educators had made the decision to adopt ICT before they had concrete

evidence the tools would achieve the desired outcome (persuasion and confirmation). It appears that early adopters in this study all approached this “innovation-decision” process of incorporating innovative technologies into their teaching practice from frames of reference that involved taking risks when trying to solve a perceived problem, or when finding an opportunity to leverage the potential of ICT to promote engaged learning, rather than the staged process indicated in Rogers’ theory. Perhaps it is these frames of reference that delineate these early adopters from individuals who may adopt innovations in the future. The early adopters may not need to pass through all the steps of the decision process.

What this means for educational programs adopting new teaching tools, I am uncertain. Perhaps this insight, that the decision process for these early ICT adopters is different from that of the later adopters is a topic for future research in the area of organizational change management as it pertains to the diffusion of an innovation.

E. Beyond frames of reference, early adopters need support

These early adopters of ICT in healthcare education consistently maintained that support from their organization and colleagues was important. Although support may not have actually been present, these early adopters all believed they were supported in their innovation teaching endeavors. Organizations striving to encourage early adoption of ICT into their instructional methods need to be mindful of the support they provide to faculty.

Early adopters by virtue of their frames of references – risk-taking and problem solving may continue to adopt new tools into their practice because they “believe” they are supported. However, this may not be the case for potential adopters.

Early adopters consistently cite financial and time constraints as barriers to ICT use, but continue to adopt new tools when relevant. Obstacles are not barriers for these risk-takers and problem solvers. However, other educators who look to these influential colleagues may not view adoption of innovative tools from the same frame of reference, and choose not to adopt tools because barriers are obstacles for them. Organizations need to concretely support (time and money), and celebrate the efforts of healthcare educators using ICT if others are jump onto the diffusion bandwagon.

VI. Concluding Thoughts and Recommendations

This study of ICT adoption into healthcare education at the University of Alberta highlights that the adoption of learning technologies among early users occurs in relative independence of organizational support, or strategy. These individuals – early adopters of ICT in their teaching practice – use innovative teaching methods to share and transfer knowledge because they perceive a problem, and can take a risk that the relevant technology of our time can make learning for healthcare students more engaging.

If e-learning in healthcare education is to diffuse within an established social structure, the prevailing organization needs to leverage the influencing potential of the early adopter. Hence, these more succinct descriptors – the frames of reference that guide adoption of new and novel ideas/processes – may be useful. The frames of references identified in this study of healthcare educators at the University of Alberta (risk-taking, and problem solving) appear to mitigate the challenges adopters face when integrating new learning technologies into their teaching practice. It is important to acknowledge that these insights cannot be extrapolated to all early adopters in healthcare education, or ascribed to healthcare educators in other learning institutions. However, these insights paint a more succinct picture for the organization of who the early adopter is, as the diffusion process is occurring.

Secondly, this study highlights the need for an integrative approach by the organization to identify and support the early adopters of ICT who now work in structures that often leave them to operate in isolation. If early adopters are to act as

“change agents” or “influencers” by impacting the decision processes of future adopters, educational institutions in healthcare need a strategic vision for the diffusion of e-learning, otherwise the adoption of ICT will remain fragmented. To unleash the potential of these early adopters as agents of change, organizations need to actively utilize their knowledge and experiences with ICT adoption in a meaningful way. They need their early adopters to be more than “test pilots” working on the fringes of the larger organization. These individuals need dedicated time and resources to cultivate and grow the field of ICT use in the healthcare education. A starting point could be the creation of an institutionally supported multidisciplinary community of ICT healthcare educators that has a dedicated platform to share approaches, relate stories of success and failure with ICT, explore new tools, and conduct research in this evolving field with both their colleagues, and the organization at large.

Early adopters of ICT in healthcare education cannot exert their influence as change agents alone, they need their organization to facilitate an integrated approach that leads change from the bottom up.

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Appendix 1

An Invitation to Participate in a Healthcare Education Study

Dear [Healthcare Educator],

My name is Dianne Eliuk and I am a graduate student at the University of Alberta. I am seeking your participation in an exploratory study of healthcare educators who use information technologies in their teaching practice. I am contacting you based on your public online profile in healthcare education that indicates you adopt, use, or have an interest in e-learning. I would like to meet with you for approximately 45 to 60 minutes to discuss your use of e-learning technologies in your teaching practice. Your name and identifying information will remain confidential.

Today's healthcare students are "digital natives" and often more comfortable engaging with information and knowledge sharing technologies of this digital era. Insights from healthcare educators who use and adopt new technologies in their teaching methods are important to both students and teachers as we undertake the challenges that accompany the use and adoption of emerging information technologies of our time. This exploratory study will look at how and why healthcare educators use information technology (IT) extensively in their teaching practice, and if this group of educators provides a common frame of reference for e-learning technology adoption in traditional healthcare education. Insights from this exploratory study may provide a basis of understanding for further research to consider how their methods minimize the challenges of IT adoption and use in healthcare education.

e-learning is defined in the medical education literature as: "learning mediated by technology, such as the World Wide Web, intranet, and multi-media based computer applications"

Kim, S. (2006). The future of e-Learning in medical education: current trend and future opportunity.

Journal of Educational Evaluation for Health Professionals, 3:3, pp. 1-11. Retrieved from

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2631188/>

This study is being done as a final project in the completion of a MA in Communications and Technology.

Title of Research Project – Digitizing Healthcare Education: An exploratory study of early adopters of e-learning technologies in healthcare education.

Researcher:

Dianne Eliuk
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Project Supervisor:

Dr. Ann Curry, Professor
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If you are interested in participating in this research project that will explore how you incorporate e-learning into your teaching practice as a healthcare educator, email your preferred contact information to Dianne Eliuk: deliuk@ualberta.ca
Upon your reply, an information letter will be provided to you outlining the study framework to allow you to make your decision on participating in this study.

Thank you for your time and consideration in participation in this study.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board (REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

Information Letter

Title of Research Project – Digitizing Healthcare Education: An exploratory study of early adopters of e-learning technologies in healthcare education.

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Background:

Today's healthcare students are "digital natives" and are often more comfortable learning with the digital technologies they use in their daily lives. Further, they expect technology to be a part of their educational experience. Conversation in healthcare education indicates the desire to incorporate these information technologies (IT) into traditional teaching practice. However, the literature suggests the use of digital platforms for e-learning in healthcare is varied and evolving, leaving educators challenged as how best to use emerging IT in educating this generation of digital natives. Exploring how early adopters use innovative digital tools in traditional healthcare teaching practice could provide valuable insights that benefit both healthcare educators and students in their educational journey in the current digital era.

This study is being done as a final project in the completion of a MA in Communications and Technology.

Purpose:

This qualitative study will look at how and why healthcare educators use IT extensively in their teaching practice. Moreover, it will explore if this group of educators share common characteristics that may encourage e-learning technology adoption in traditional healthcare education. Insights from this exploratory study may provide a basis of understanding for further research to consider how to minimize the challenges of IT adoption and use in traditional healthcare education.

Methods:

Participants will be interviewed in a face-to-face format at a location suitable to both participant and researcher. A series of pre-determined questions will be asked, and should take 45 – 60 minutes. The interview session will be audio recorded. Audio recordings of the interview will be typed into transcript format, removing all identifying information. Transcripts and audio recordings will remain the sole possession of the researcher listed above.

Voluntary Participation:

You have the right to refuse this invitation to participate or to refuse to answer any of the questions asked during the interview. You are also free to stop the interview at any time or request withdrawal of your information from this study (transcripts, audiotapes, notes). Request for withdrawal of data from study must be received by author in writing (e-mail) within two weeks from the date of the interview.

Confidentiality:

The information gathered during the interview will be used for an exploratory study of healthcare educators using IT in their educational practice. Participants will not be identified by their real names in the study. Only the researcher listed above will have access to personal contact information. Data will be kept in a locked filing cabinet in the above listed supervisor's office on the University of Alberta, Enterprise Square Campus for five years following the completion of the research project. When appropriate, data will be destroyed (wiping clean flash drives/audiotapes, and secure electronic shredding of paper transcripts/notes).

Benefits:

This study may or may not have any direct benefits for you. However, participation in this semi-structured interview may provide you the opportunity to reflect upon your teaching practice.

This study is expected to add to understanding of the “how and why” of IT adoption in traditional healthcare education. Moreover, insights into IT use in healthcare education can lead toward teaching practices that provide students with the most appropriate tools for learning in this digital era. Finally, this study may provide insights for future research that considers how to minimize challenges that educators face with IT adoption in healthcare education.

Other Uses:

The resulting research may be used in published journal articles and for professional presentation (teaching and/or conferences). However, the identities of the participants will remain protected.

Withdrawal from the study:

There are no known risks to participation in this study. You may withdraw from the study at any point by verbalizing this to the above listed researcher. If you chose to withdraw from the study, the audio recordings and any transcripts that have been made will be destroyed immediately.

Thank you for taking part in this study.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board (REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

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Please circle your answers:

I have read and received the Information Sheet. Yes / No

I have had an opportunity to ask questions and discuss this study to my satisfaction.
Yes / No

I understand the benefits and risks involved in taking part in this study. Yes / No

I understand that I can withdraw at any time during the data collection part of the study
and that any comments that I have provided up to that point will not be used. Yes/No

Confidentiality has been explained to me, and I understand who will have access to the
data collected. Yes / No

I understand that the interviews will be audio-recorded and transcribed. Yes / No

*If you have further questions regarding the research, please contact the individuals listed
above.*

This study was explained to me by: _____ and I agree to take part in this
interview.

Signature of Research Participant

Printed name

Date (dd/mm/yyyy)

The plan for this study has been reviewed for its adherence to ethical guidelines and
approved by Research Ethics Board (REB) at the University of Alberta. For questions
regarding participant rights and ethical conduct of research, contact the Research Ethics
Office at (780) 492-2615.

Interview script

Research Project - Digitizing Healthcare Education: An exploratory study of early adopters of e-learning technologies in healthcare

Introduction/Opening

Welcome and thank you [participant number] for agreeing to participate in this interview. The purpose of this interview is to explore and gain insight into your educational practice using e-learning as information technologies (IT) in transferring information and knowledge in the student-instructor interaction.

This interview is voluntary and your comments will remain anonymous and confidential. Your comments will be solely used for the purpose of this research project in partial fulfillment of COMM 900, a course in the Master of Arts in Communications and Technology program, at the University of Alberta.

If at any time you wish to end the interview or wish not to answer the question presented, please feel free to inform me that this is your request.

I plan to record our interview and take brief notes to allow for accurate reflection and analysis of your insights on the topic of e-learning in medical education.

e-learning as defined in the medical education literature:

“learning mediated by technology, such as the World Wide Web, intranet, and multi-media based computer applications”

Kim, S. (2006). The future of e-Learning in medical education: current trend and future opportunity. *Journal of Educational Evaluation for Health Professionals*, 3:3, pp. 1-11. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2631188/>

Date & time: _____

Interviewee # & educational program: _____

Interview questions

Demographic/background information

1. Age?
2. Number of years teaching in healthcare?
3. Years teaching using e-learning tools in practice?
4. How would you describe your philosophy regarding your teaching strategy? How does e-learning fit into this view?

Prior history with digital technology/tools

1. How long have you been interested in digital-IT and why?
2. Are the tools of the web a part of your daily life?
3. How do they enhance or complicate your life?

E-learning as used in your current educational practice

1. How and when do you use IT in your teaching
2. How frequently are the tools of e-learning used in your teaching practice?
3. Have you incorporated new IT tools in this current teaching year? If yes, what tool/tools and how? If no, why?
4. How do you determine when to use IT in your teaching practice?
5. How do you learn about emerging IT for knowledge transfer in education practice? Are these technologies specific to healthcare education or have you modified them from other areas of educational practice?
6. How has your department/administration responded or supported the incorporation your new teaching methods? (i.e. budget; time) Does this impact your decision when seeking out new IT teaching tools for your courses?
7. How do your colleagues respond/react to your use of new e-learning tools in the courses you teach? Does their reaction impact your decision when seeking out new IT teaching tools for your courses?

Perceptions regarding use of e-learning/digital technology

1. Do you think your students like or benefit from IT in your teaching practice? Why or why not?
2. Do you think you like or benefit from IT in your classroom? Why or why not?
3. Does the larger medical community and/or public at large benefit from IT use in the classroom? Why or why not?
4. How do you view yourself and/or your role as an educator adopting new IT tools and methods in healthcare education?
5. Where do you see the future of IT in healthcare education and professional practice?

Closing/Conclusion of Interview

Thank you for your time and valuable insights into e-learning in medical education. As our time is coming close to the end of this session, are there comments or insights that you feel are important to share that I have not addressed?

If you have any questions for me with regards to this interview, please feel free to contact me at the following e-mail address: deliuk@ualberta.ca

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board (REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

Appendix 5

Notification of Approval

Date: February 7, 2013

Study ID: Pro00036259

Principal Investigator: [Dianne Eliuk](#)

Study Supervisor: [Margaret Curry](#)

Study Title: Digitizing Healthcare Education: An exploratory study of early adopters of e-learning technologies in healthcare education.

Approval Expiry Date: February 6, 2014

Thank you for submitting the above study to the Research Ethics Board 1 . Your application has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Sincerely,

Dr. William Dunn
Chair, Research Ethics Board 1

Note: This correspondence includes an electronic signature (validation and approval via an online system).