Understanding Factors that Influence College Faculty in Deciding to

Adopt Digital Technologies in their Practice

Final

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A thesis submitted in conformity with the requirements

for the Degree of

Master of Arts

Graduate Department of Education at the

University of Ontario Institute of Technology

Acknowledgements

This thesis paper would not have been achievable without the assistance and patience of a number of highly valued individuals who supported and guided me throughout my MA course work, the subsequent research study and ultimately this paper. I hold these individuals in high regard and to each I owe a huge debt of gratitude.

I would first like to thank my wife, Pat Vale-Dougherty, for her unwavering love, support and encouragement; I could not have persevered to this point and without her excellent proofreading ability with a steadfast eye for detail this paper may never have been completed. I would like to thank my children, Caitlin Dougherty-Calderone and Colin Dougherty and my son-in-law Brad Calderone for their tolerance and cheerleading throughout this endeavour.

I would like to thank Dr. François Desjardins for recruiting me to the MA program and for standing as my mentor, my supervisor and my friend who was always accessible and willing to provide advice and guidance throughout my entire MA experience. I would like to thank Dr. Bill Hunter for encouraging me in my writing and for always providing honest and straightforward advice. I would like to thank my colleagues at Durham College, Kathleen Stewart and Thom MacDonald, for joining me in this journey through graduate studies, for acting as sounding boards and for providing much needed humour throughout.

Finally, I would like to thank the college faculty who participated in my study through the online survey and face-to-face interviews for providing their time and much appreciated insights into their teaching and learning practices.

Abstract

College faculty in Ontario are using a variety of digital technologies, at differing levels, in their teaching and learning practices. College administrators are looking to faculty to help meet the challenges associated with increasing enrollment and the need to deliver curriculum to a diverse student population with a range of learning needs who have unlimited access to information and communication channels through the World Wide Web. This research provides some understanding of specific motivating factors that have led many in community college faculty to adopt digital and Web technologies into their teaching and learning practices as well as those factors that may lead other college faculty to adopt similar technologies into their practices. A modified decomposed theory of planned behaviour (DTPB) was implemented as a theoretical framework for this study and data collection was undertaken using a mixed-method approach using both quantitative and qualitative methods in an effort to fully realize and categorize the factors necessary in a faculty decision to adopt digital technologies into their teaching practice. Findings indicate that digital technologies are employed by faculty in some cases only to achieve efficiency in communication and administrative tasks favouring traditional teaching methods in their classrooms. Others are exploring and experimenting in exciting new ways with digital technologies in an effort to enhance the learning experience for their students in and out of their classrooms. In addition to the varying teaching and learning beliefs held by faculty there are other factors that should be considered by college administrators when attempting to motivate faculty to adopt digital technologies into their practices. There are also many challenges facing college administrators and faculty who should revisit traditional approaches to assigning workload, providing support and training, and the overall approach to teaching and learning, all of which carry with them financial and cultural implications.

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Community colleges across the country are currently attempting to adapt to changes in student learning and work habits. This is due, in significant part, to the emergence of digital and Web technologies that enable new ways to collaborate, evaluate, create content and reflect on learning experiences (Duffy & Bruns, 2006). Digital and Web technologies are driving the need to create learning experiences that will allow students anytime, anywhere access to content. Additionally, rather than simply act as repositories for content, social media tools can allow for the development of "a growing assortment of cognitive skills in order to perform and solve problems in these environments" (Duffy & Bruns, 2006, p. 31). Community colleges, like other institutes of higher education, are looking to faculty to increase their personal use of digital and Web technologies to grow capacity in online and hybrid learning (Meyer & Xu, 2009).

Community colleges are ready and willing to move toward the adoption of new digital technologies to enhance the teaching and learning experience. Unfortunately, financial restraints and a lag in uptake in adoption by many college faculty is widening the gap between what students want, and need, to succeed in today's workforce, and what colleges are presently providing in their teaching and learning environments (Johnson, Adams & Cummins, 2012). The inevitable shift in teaching and learning paradigms that is required in a move to more collaborative models is a challenge for many in education to embrace into their personal practices (Johnson et al. 2012). Quite often faculty will cite that they don't have the time or skill-set to adopt digital technologies into their practice (Conole & Alevizou, 2010). Among faculty, "there is a lack of understanding of the implications of adopting more open approaches and indeed negative attitudes and fear of openness" (Conole & Alevizou, 2010, p. 23).

College administrators are wrestling with how to positively engage the majority of their faculty members in the adoption of new digital technologies to enhance teaching and learning (Johnson et al., 2013; Ajjan & Hartshorne, 2008). Although there are many predictive models of adoption and technology acceptance that can reveal much about adoption rates and best practices, there is little research available on why individuals adopt or reject a specific technology adoption (Rogers, 2003). There is a need to build an understanding of motivating factors for adoption, it is also essential to build an understanding of why individuals choose not to adopt a technology into their practice (Rogers, 2003). This paper will examine factors that influence college teachers to adopt digital technologies in their practice in an effort to build an understanding of the potential motivators for faculty to adopt or not to adopt, a new technology in their practice.

<div align="center">**Research Context**</div>

What Online and Digital Technologies Provide

The 2013 Horizon Report for Higher Education (Johnson et al., 2013) reports that today's workforce requires graduates to possess communication and critical thinking skills that can be nurtured through the type of informal learning afforded by new and emerging Web and digital technologies. The rapid advancement of Web and digital technologies has created an atmosphere for today's learner that provides access to content and experiences far beyond what the traditional learning environment of the late 20th century provided allowing now for rich collaborative problem-solving and self-directed learning experiences (Groff, 2013; Conole & Alevizou, 2010). Examples of some existing, new and emerging digital tools in use and coming available for use in higher education include Learner Management Systems (LMS), blogs, wikis, social media, video and image sharing, simulations, games and gamification, handheld and tablet

computing, digital cameras and scanners, Web apps, virtual environments, augmented reality and wearable technology (Groff, 2013; Johnson et al., 2013).

Colleges now have the opportunity not only to expand their audience beyond their walls, but also to provide a richer learning environment to all students than was possible through traditional methods. Research indicates that self-directed, or inquiry based learning, is a key element in building communication and critical thinking skills and that learning extends through exploration and self-directed learning more so than with other pedagogies (Barron & Darling-Hammond, 2010). Groff (2013) further suggests that these skills can be nurtured to a higher level thanks to the rapid advances in Web and digital technology tools available. Although digital technologies are not strictly required for self-directed learning to take place, they allow for greater depth of resources and a richer collaborative learning environment, in fact digital technology can be the starting point for self-directed or inquiry based learning (Groff, 2013; Jacobson, 2010). Siemens (2004) suggests that Web and digital technologies allow for access to knowledge in ways that have dramatically changed and will continue to change learning processes. The tools that individual learners use are changing the way collaboration and critical thinking occurs as well as changing the roles of faculty in facilitating the learning (Downes, 2013; Conole & Alevizou, 2010; Siemens, 2010).

Students' Use of Digital and Web Technologies

A Colleges Ontario (2013) environmental scan shows that 79% of students entering college today fall in the age range of 25 years and younger. These students belong to a generation that has grown up with computers and the internet and as such are considered to be highly proficient with those technologies relative to previous generations. It is clear that there is an increased demand for customized learning that provides choices for learners regarding access

to content, expertise and methods of learning (Johnson et al., 2013). Shirky (2008) suggests that

the advent of Web and digital technologies themselves have not inspired change, it is the

saturation point of these technologies in the students' lives that is driving change in all areas of

society. Any time a technology becomes a normal part of our daily lives, reaching a point where

it is almost invisible, "really profound changes happen" (Shirky, 2008, p. 105). Students' use of

Web and digital technology appears to be at that point, they seem to be immersed in digital

technologies in a way that requires the development of a new approach to learning that is focused

on "speed of access, instant gratification, impatience with linear thinking and the ability to multi-

task" (Bayne & Ross, 2011, p. 159).

It is important to consider that classifying these students as "digital natives" with evolved

cognitive skills that come from constant interaction with digital and Web technologies (Prensky,

2001) may ignore the reality of student diversity in experiences with digital and Web technology

based on socio-economic background (OECD, 2012; Bayne & Ross, 2011). Additionally, while

students overall are engaged with digital and Web technologies in their everyday lives it is not

yet clear that their experience in their personal lives can easily "translate into beneficial

technology-based learning" (OECD, 2012, p. 120). Kolikant (2010) posits that through students'

use of Web and digital technologies for personal use to find something and use it to build

something for their own use they may eliminate the need for holding information in their heads.

It seems that some students see digital and Web technologies as tools that can increase their

productivity and thus their educational performance, perhaps even reducing the effort required to

succeed (OECD, 2012). Jacobson (2010) asserts that for students to move beyond collecting

information they require guidance and mentoring "towards the deeper conceptual understandings

and core competencies that allow them to reason about real-world problems, critically analyze

information, and engage successfully in 21st century work" (para. 6). Further it is evident from the literature that while the majority of today's students may generally be classified as digital natives they all require some level of guidance or coaching in the appropriate and effective use of Web and digital technologies in order to succeed academically and professionally (Groff, 2013; OECD 2012; Bayne & Ross, 2011; Kolikant, 2010).

Faculty Use of Digital and Web Technologies

There is a widely held assumption that many higher education faculty can largely be described as "digital immigrants" as they weren't born into a Web and digitally enabled world but came to it later in their lives (Prensky, 2001). Pedró (2009) suggests that contrary to this age-based classification of faculty as digital immigrants most faculty in higher education have attained a high skill level and highly effective competency with Web and digital technologies. Faculty do not necessarily have the same "attachment to technology" (Pedró, 2009, p. 12) as their students do but their use of Web and digital technologies has already contributed to the transformation of the learning environment with regard to course instruction, content delivery and assessment through widespread adoption of LMSs (Johnson et al., 2013; Pedró, 2009).

With faculty apparently comfortable with many new Web and digital technologies there seems to be a misalignment between faculty abilities and the level of adoption of these tools in their learning practices (Conole & Alevizou, 2010; Brzycki & Dudt, 2005). Groff (2013) suggests the key is to consider first what learning experiences are desired and then determine what technologies to employ. While Web and digital technologies may now be a catalyst for change, the direction of that change still needs to be determined by faculty and students who use those technologies (Kikis, Scheuermann & Villalba, 2009; Crook et al., 2008). Much of the research indicates an acknowledgement that students' use of Web and digital technologies and

their ability to easily access information that was previously held and delivered solely by the teacher in the room is driving much of the necessary change in teaching practices. Just what those changes are and what technologies are necessary is still the focus of much debate (Groff, 2013; Conole & Alevizou, 2010; Afshari, Abu Bakar, Su Luan, Abu Samah & Say Fooi, 2009; Crook et al., 2008).

Adoption of Digital Technologies by College Faculty

All institutions of higher education are engaged in planning to expand capacity in teaching and learning using digital technologies with a focus on faculty development to support adoption of digital technologies to support online learning (Myer & Xu, 2009). With the emergence of Web 2.0 tools there is also a growing sense among some faculty that the use of social media could lead to improved student engagement and a rich environment of collaborative knowledge creation (Ajjan & Hartshorne, 2008). While college administrators strive to expand capacity in online delivery and encourage the leveraging of social media tools in and out of the classroom; there is a slower than desired uptake in the adoption of those technologies by many faculty. This can be attributed to a number of factors that may include, but are not limited to, resistance to change, low self-efficacy in the use of digital technologies and social media, a lack of effective support and training, a lack of perceived usefulness and a lack of clear understanding of faculty needs and beliefs about those technologies (Ajjan & Hartshorne, 2008; Myer & Xu, 2009; Sugar, Crawley & Fine, 2004). Finley and Hartman (2004) found that there is a growing sense, among some of the more experienced faculty, that their students know considerably more about, and feel more comfortable working with, digital technologies and social media than they do themselves. This lack of working knowledge of digital technologies and social media builds insecurity in faculty that they may not have all of the answers for their students and thus they

may be giving up some control in their teaching practices by adopting digital technologies intheir

teaching practices (Bowe, 2011; Crook et al., 2008; Finley & Hartman, 2004). There is literature

that indicates that not all students are anxious to include the use of Web and digital technologies

into their learning (Groff, 2013; OECD, 2012; Bayne & Ross, 2011; Ellison & Wu, 2008). Some

students actually seem more reluctant to adopt Web and digital technologies into their learning

than their levels of use would indicate (Pedró, 2009).

Motivation to Adopt Digital Technologies

The motivating factors that may influence faculty to adopt, or not to adopt, digital

technology into their practice can be elusive, with much of the literature pointing to individual

and social drivers to change in practice (Afshari et al., 2009; Ajjan & Hartshorne, 2008; Beggs,

2000; Hanson & Salter, 2001; Owen & Demb, 2004). Hanson and Salter (2001) suggest a "two-

pronged approach" (p. 281), with the building of an adoption plan focusing on individual faculty

needs and beliefs, along with an overarching organizational plan for rollout of a new technology.

Finley and Hartman (2004) assert that the growing sense of urgency for college faculty to

move toward the adoption of digital technologies seems to be predominantly driven from the top-

down with leadership insisting that adoption is critical to the institution's ability to "stay ahead

of" their students (p. 327). Rather than rush all faculty to adoption, administrators should be

working with faculty groups to understand the pedagogical impact of an implementation of

digital technologies into teaching and learning. With this approach, faculty and administration

can build a common understanding of the changes that would be necessary in individual faculty

practices (Finley & Hartman, 2004; Owen & Demb, 2004). In many cases the timelines for

adoption set out by administration make it difficult for faculty to feel comfortable with the

technology in their practice before moving on to the next innovation (Owen & Demb, 2004).

Brzycki & Dudt, (2005) found that faculty feel they have been "bombarded with successive waves of innovations for decades" (p. 637) leaving them with the view that new innovations are simply problems competing for attention, time and resources. Owen and Demb (2004) further suggest that the current top-down approach taken by many institutions leaves out those who are not designated "champions" or part of the planning committee leading to a greater loss of control being felt by faculty in their own teaching practices. A bottom-up approach may be more appropriate where faculty who have adopted Web and digital technologies into their practice share their successes with administration in an effort to gain a commitment to adoption across the institution (Baltaci-Goktalay & Ocak, 2006).

Group dynamics. Hanson and Salter (2001) state that an organization's social system "is defined as a set of interrelated units with a common goal and structure," (p. 285) each with its own norms, opinion leaders, change agents, and "change aides." With this in mind, it is critical for administration to focus on building the level of favourable attitudes toward a digital technology adoption across the organization. As an individual's experiences with a digital technology, either negative or positive, are communicated through an organization's social system, a set of shared beliefs toward the technology begins to form (Roca, Chiu & Martinez, 2006).

While some of the literature supports the role of individual teachers as agents of change within their population (Afshari et al., 2009) it appears the sociability and solidarity of smaller groups may be a more fertile ground for the development of positive beliefs toward a specific adoption (Finley & Hartman, 2004). Beggs (2000) found that technology use by one or more individual faculty may have little influence over others across the institution. Rather than seek out individual change agents, it appears to be more imperative that the organization's leadership

promote, and attempt to leverage, the positive benefits of a specific adoption through the positive experiences and shared beliefs of various groups working with the technology in question (Ajjan & Hartshorne, 2008; Roca et al., 2006). Owen and Demb (2004) indicate that a sense of "have and have-not" can develop within an organization that is implementing a large-scale adoption of a digital technology. Without careful consideration of an organization's social system and shared beliefs, there could emerge a massive disruption of the culture of that organization (Owen & Demb, 2004; Roca et al., 2006).

Individual motivators. While it appears to be easier to identify specific barriers than it is to identify motivators for technology adoption by individual faculty, the literature indicates that any barriers identified can lead to the development of solutions to those barriers and aid in the motivation for individual faculty to adopt (Afshari et al., 2009; Huang & Jabor, 2011). Faculty have little time to dedicate to changing their practice, yet they feel pressured to change pedagogical approaches that have proven, and continue to be successful for them (Hanson & Salter, 2001; Huang & Jabor, 2011; Owen & Demb, 2004; Brzycki & Dudt, 2005). Faculty have concerns regarding their students' familiarity with Web and digital technologies yet displaying shortcomings in the appropriate use of those technologies as is evidenced by an apparent increase in plagiarism (OECD, 2012; Bowe, 2011; Pedró, 2009). Faculty need to incorporate into their practice a way to help students understand the appropriate use of these tools in problem-solving and critical thinking rather than simply as tools for finding answers to problems (OECD, 2012; Crook et al. 2008).

Sugar et al. (2004) suggest that adoption of digital technology is essentially personal in nature. It is evident that faculty needs to know and understand the implications with regard to instruction and student learning (Kikis, Scheuermann & Villalba, 2009; Crook et al., 2008;

Finley & Hartman, 2004; Sugar et al., 2004) yet much of the literature supports the need by individuals to first discover the personal benefits for individual faculty in the adoption of digital technologies. In fact it may be true that even before considering any potential benefits to student learning, individual faculty need to understand the personal benefits to their practice, or "perceived usefulness" of a specific digital technology (Ajjan & Hartshorne, 2008; Beggs, 2000; Huang & Jabor, 2011; Roca et al., 2006; Sugar et al., 2004).

There are varying degrees of comfort or "self-efficacy" in dealing with technology as found by Huang and Jabor (2011). Roca et al. (2006) found that computer self-efficacy was a significant determinant of perceived ease of use of digital technology. In their study, Afshari et al. (2009) identified both "manipulative" and "non-manipulative" factors that may have an effect on the motivation by faculty to adopt specific digital technologies. Manipulative factors are those factors relating to teachers' attitudes and beliefs toward teaching and digital technologies while non-manipulative factors are those that cannot be influenced by the organization but may have an effect on an individual's motivation to adopt such as age, years of teaching experience and gender (Afshari et al., 2009).

A full understanding of faculty beliefs and teaching needs regarding the adoption of a specific digital technology into their personal teaching practices is essential. With this understanding, the organization can help promote the personal benefits of adoption to individual faculty by demonstrating a degree of perceived usefulness that will entice faculty to move toward adoption (Sugar et al., 2004). Overall, given the time to train, implement and reflect on the impact of the technology on their practice, individual faculty may become motivated to continue on to further adoption of digital technologies and may be further motivated to become change agents for the adoption of technology (Beggs, 2000; Huang & Jabor, 2011; Sugar et al., 2004).

The Role of Administration

Some of the literature suggests that adoption is occurring regardless of individual faculty by-in, in large part, due to administration requiring faculty to adopt new Web and digital technologies into their practice (Baltaci-Goktalay & Ocak, 2006). Bayne, (2011) further posits that some faculty may simply adopt new technologies into their practice strictly to "maintain their viability as employable, relevant, 'quality' academics" (p. 162). While faculty require that their adoption of Web and digital technologies in their practice be based on their own beliefs and their students' needs, many in administration feel that adoption is necessary due to the prevalence of these technologies in society and their need to keep up with their students (OECD, 2012; Bowe, 2011). It is clear through much of the literature that the key to a successful digital technology adoption is the identification of forces driving the need for the adoption and a descriptive framework for the adoption of the technology in question. The resulting adoption plan must be supported through a common vision developed by, and for all stakeholders (Groff, 2013; Finley & Hartman, 2004; Hanson & Salter, 2001; Myer & Xu, 2009; Owen & Demb, 2004; Sugar et al., 2004).

Support and training. Huang and Jabor (2011) assert that well planned training "can have a positive effect on the perceived usefulness" (p. 59) of a specific digital technology. They further indicate that a support facility "can have a positive effect on faculty self-efficacy" (p. 59) with a new technology. The literature advises that any training and technical support be open and accessible and available through multiple modes (Afshari et al., 2009; Owen & Demb, 2004). While it is clear that training and support are critical to the successful adoption by an individual, Ajjan and Hartshorne (2008) suggest that the establishment of facilities and resources alone are not enough. There is a need for a "best practices" model, that faculty can relate to, to

"further facilitate the adoption of digital technologies as tools for improving teaching and learning" (Ajjan & Hartshorne, 2008, p. 79). With regard to training, there should be a built-in requirement for the long-term development of mentors and the sharing of the knowledge gained (Afshari et al., 2009; Finley & Hartman, 2004). In the establishment of technical support, it is critical that the institution incorporate the development of a feedback loop that captures the experiences of individual faculty from the early stages of the adoption to allow for adjustments to the planning and implementation process (Owen & Demb, 2004). Roca et al. (2006) found that the overall quality of technical support for a digital technology is a necessary precursor for the success of the adoption.

Rather than simply provide general encouragement toward adoption based on documented trends in higher education, Sugar et al. (2004) affirmed the need for a consistent supportive message directed at the adoption of a technology into faculty teaching practices. Administrators can support faculty in their adoption of technology by providing direction and guidance through the process (Finley & Hartman, 2004). Finley and Hartman (2004) also found that by working with faculty to build a vision for adoption, leaders in the institution indirectly build a supportive environment based on an understanding of faculty beliefs and teaching needs.

Recognition. Faculty feel that the extra effort put into adopting new technologies into their classroom is not sufficiently recognized by existing, out of date, workload formulae (Owen & Demb, 2004). While administration pushes for faculty to adopt based on the perceived benefits to students and student learning (Beggs, 2000), the literature shows that there must be recognition of the benefits for faculty in the adoption of a digital technology if there is to be a successful uptake of that adoption (Ajjan & Hartshorne, 2008; Finley & Hartman, 2004; Meyer & Xu, 2009).

With clearly defined benefits for students and faculty in the adoption of a digital technology, administration should consider incentives, or rewards, for adopters as they face significant changes in their workload and teaching practices (Gallant, 2000). Reward or recognition can be provided by administration in the form of release time, funding for professional development, incentives for training in non-teaching periods and incentives for collaboration at the program level (Finley & Hartman, 2004). There is a need for administration to provide recognition in the form of opportunities to share successes in adoption with the larger faculty community (Groff, 2013; Laurillard, 2011). Faculty may attempt an adoption of technology into their practice if "they are supported and rewarded for doing so" (Finley & Hartman 2004, pp.328-329). Finley and Hartman (2004) further suggest that a lack of support in the form of incentives may actually constrain change.

The Adoption Gap

In reviewing existing research it has become clear that there are a number of factors at play that may influence faculty in their adoption of digital or Web technologies in their practice. With this knowledge it should be possible for administration to positively engage faculty in an effort to expand capacity in teaching and learning using digital technologies. What the existing research also indicates is that there is a gap between the desired level of adoption by administrators and faculty engagement in adoption (Huang & Jabor, 2011; Conole & Alevizou, 2010; Ajjan & Hartshorne, 2008). Regardless of how effective the use of a new technology may appear, or how engaging a teaching and learning strategy is shown to be, motivating faculty to adopt and change their own practice still remains a challenge (Fullan, 2007). Bowe (2011) maintained "it is often difficult to understand why an instructor does not adopt an innovation when the benefits seem to be so clear" (p. 1779).

College administrators' beliefs that students are urging schools to adopt technology at an ever increasing rate may be an oversimplification of the situation. Students' use of digital technologies does not necessarily indicate that they possess the skills to competently implement those technologies in their learning, nor might they be interested in new and innovative teaching methods (OECD, 2012; Pedró, 2009). Both administrators and faculty agree that there are many new Web technologies that could bring added value to teaching and learning (Groff, 2013). Any added value cannot be achieved without first understanding what the desired learning outcome is that those technologies might afford or support. Rather than simply adopting technology based on a real or perceived demand by students, or at the request of administration, faculty require consideration be given to pedagogy and how the technology can support them and their students in their practice (Crook et al., 2008).

In reviewing existing research on all possible factors that may motivate faculty to adopt a new digital or Web technology into their practice it seems clear that faculty must be included in any decision making process (Baltaci-Goktalay & Ocak, 2006; Brzycki & Dudt, 2005). Some faculty have been adopting digital technologies in their practices in innovative ways that support an engaging learning environment (Groff, 2013). It may prove beneficial to engage those who have successfully adopted in discussion with other faculty in an effort to build a "collaborative professional practice – actively exploring new ideas, with colleagues, and vetting them for effectiveness together" (Groff, 2013, p. 23). Faculty are continuously attempting to understand and balance the numerous innovative approaches to teaching and learning with, and without, technology that are presented to them on a regular basis (Fullan, 2007). Any innovation involving the adoption of new digital or Web technologies must fit within each faculty's learning environment and within their pedagogical beliefs for that environment (Crook et al., 2008; Levin

& Wadmany, 2008). These technologies should not be mandated by the institution without this consideration. Rogers (2003) maintains that "adoption or rejection is always 'right' in the eyes of the individual who made the innovation-decision….individuals' own perceptions count in determining their innovation behavior" (p. 116).

Research Question

Adoption of Web or digital technologies by college faculty is not occurring at the same rate as college administrators would like to see realized, nor is it evident to administrators what might be necessary to achieve their goals for adoption among faculty (Huang & Jabor, 2011; Conole & Alevizou, 2010; Ajjan & Hartshorne, 2008). This study attempts to address the apparent misalignment in faculty adoption with institutional needs and student demands by posing the following research question:

What factors influence college faculty to adopt digital technologies in their practice?

Theoretical Framework

The theoretical framework for this study is based on the decomposed theory of planned behavior (Taylor & Todd, 1995) which itself is a blending of the theory of planned behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1986). The decomposed theory of planned behavior (DTPB) suggests that an individual's actions are based on their *behavioural*[1] *intentions* and perceived behavioural control toward the action (Ajzen, 1991). Within the context of the adoption of technology, the individual's intention to adopt a technology also depends in large part on their *attitudes* and beliefs regarding the technology (Davis, 1986). It became clear through a review of existing research that motivating factors could be grouped into one of two broad categories, personal or *intrinsic* factors and institutional or *extrinsic* factors (Levin & Wadmany, 2008; Baltaci-Goktalay & Ocak, 2006; Taylor & Todd, 1995; Davis,

Bagozzi & Warshaw, 1989). Additionally, the existing research indicates that demotivating

factors could be at play in preventing faculty from adoption. While looking at all possible

intrinsic and extrinsic factors it is important to consider which factors may act in a *positive* way

and which may act in a *negative* way in the decision to adopt digital technologies (Levin &

Wadmany, 2008; Haymes, 2008; Sugar et al., 2004; Taylor & Todd, 1995; Davis et al., 1989).

For this study, a modified DTPB has been employed as illustrated in Figure 1. This

theoretical framework was selected in an effort to better identify the intrinsic and extrinsic

factors that may inform attitudes toward, and behavioural intention to adopt, digital technologies

into a college faculty member's teaching practice. Those factors include: perceived ease of use

and perceived usefulness of a technology; subjective norms such as peer, administrative and

other institutional influences; perceived behavioural control, based on a combination of

institutional supports and self-efficacy or the individual's belief in their own abilities (Bandura,

1997); and a measure of compatibility between an individual's attitudes toward the adoption of a

technology and the institutional norms or direction toward adoption of a technology.
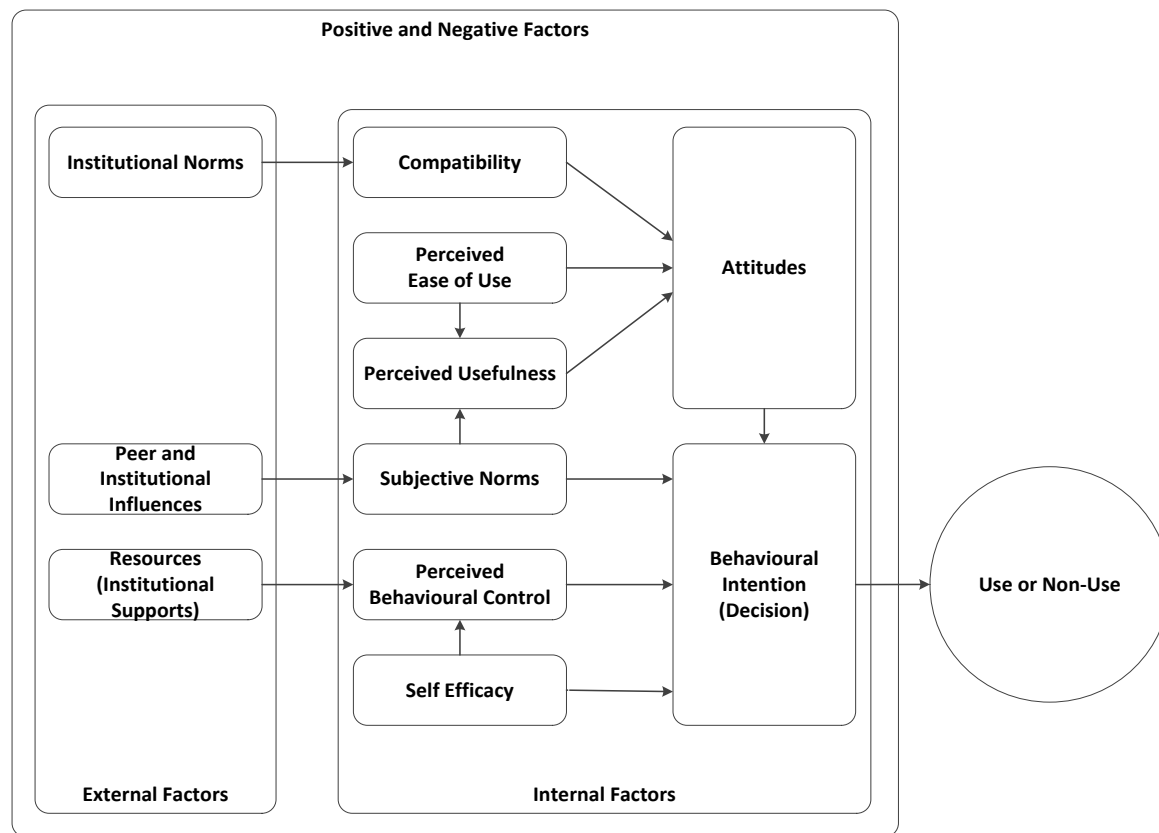
Figure 1. Modified decomposed theory of planned behaviour (DTPB). The theoretical

framework implement in this study of understanding factors that influence college faculty in

deciding to adopt digital technologies in their practice.

Taylor and Todd's (1995) DTPB shown in Figure 2 was designed as a predictive tool for

understanding information technology (IT) usage. Like its precursors, the theory of planned

behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1986), the determining

variables in the DTPB all lead to the adoption or an intention to move to the adoption of a

specific technology. The DTPB allows for a detailed understanding of the factors that could lead

to an individual's adoption of new technology; specifically, Taylor and Todd (1995) found that

their model "provides a more complete understanding of the determinants of intention" (p. 169)

when compared to other models in predicting IT usage.
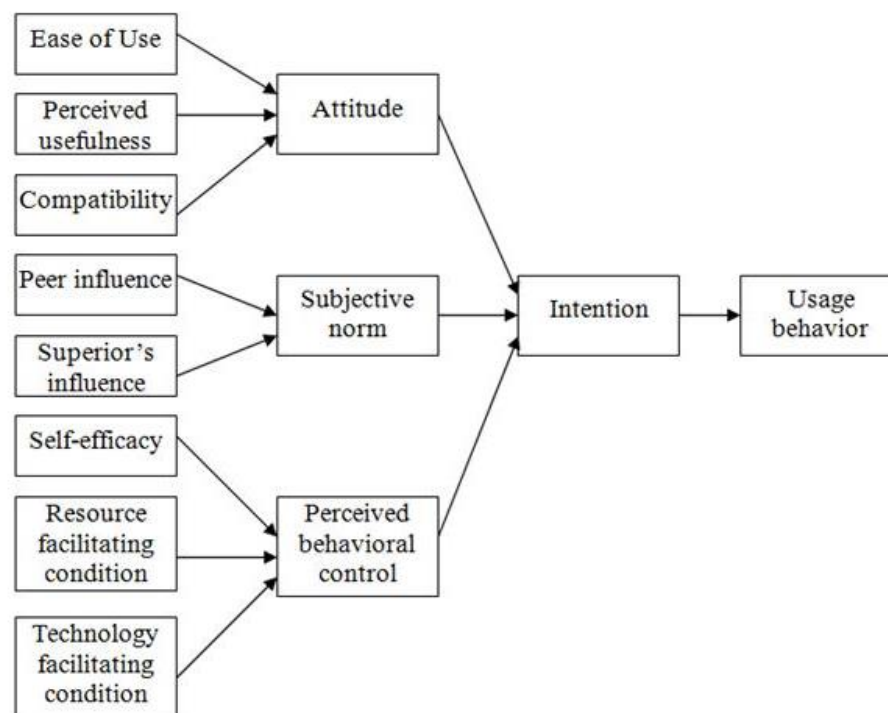
Figure 2. Decomposed theory of planned behavior (DTPB). Adapted from "Hospital-Based

Nurses' Perceptions of the Adoption of Web 2.0 Tools for Knowledge Sharing, Learning, Social

Interaction and the Production of Collective Intelligence" by A. S. Lau, *Journal of Medical

Internet Research 13*(4):e92. doi: 10.2196/jmir.1398

This study is focused on discovery of those specific factors, intrinsic and extrinsic, that

may lead college faculty to a decision to adopt or not adopt a specific Web or digital technology

in their practice and as such required that some modifications be made to the DTPB. The first

significant modification to the DTPB was to group the factors into clusters of intrinsic and

extrinsic factors. Extrinsic or external factors are those that may have an effect on an

individual's attitudes or behavioural intention but do not directly influence an individual's

behaviour (Ajzen & Fishbein, 1980). Davis et al. (1989) further assert that outside of personal or

intrinsic factors, external or extrinsic factors can only indirectly influence behaviour. The

second modification to the DTPB was to incorporate into the model acknowledgement that all factors, extrinsic and intrinsic, may influence an individual's behaviour in a positive or negative fashion. The behaviour of interest in this study is a college faculty member's use, or non-use of a Web or digital technology. The specific focus of the study is to explore those factors that led, or may lead to, a decision or the behavioural intention to adopt, or not adopt, a Web or digital technology in their practice.

Behavioural Intention

Ajzen & Fishbein (1980) assert that an individual's behaviour is determined by their behavioural intention to carry out that behaviour. Through this, it can be further extrapolated that "as a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance" (Ajzen, 1991, p. 181). The DTPB holds that behavioural intention is derived from attitudes, *perceived behavioural control* and *subjective norms* (Taylor & Todd, 1995). Taylor & Todd (1995) are also in agreement with Ajzen (1991) in that *self-efficacy* is a precursor to perceived behavioural control. Bandura (1997) suggests that self-efficacy has a role in shaping an individual's beliefs, goals and undertakings. This was based on Bandura's (1982) previous supposition that "self-efficacy judgements, whether accurate or faulty, influence choice of activities" (p. 123). Self-efficacy has an effect on behaviour directly and indirectly by influencing an individual's intention to perform a given behaviour (Bandura, 1997). It is with this in mind that a third modification was made to the DTPB for the purposes of this study that sees self-efficacy included as both an indirect and direct predictor of behavioural intention.

Self-efficacy. Bandura (1982) defines self-efficacy as an individual's judgement of their own ability in performing a specific behaviour. With regard to the adoption of technologies, the level of readiness an individual may display toward a specific adoption is based on that

individual's perception of the complexity of that technology. Perceived complexity itself is based on a combination of the skills required to adopt the technology and an individual's own capabilities (Bandura, 1997). Bandura (1997) further states that "technology is complex for people who lack the capabilities to meet its task demand but simple for those who can easily fulfill the task demand" (p. 435). In their study, Taylor and Todd (1995) found a higher level of self-efficacy led to a higher level of behaviour intention and subsequently higher IT usage.

Perceived behavioural control. The concept of perceived behavioural control refers to an individual's "perception of the ease or difficulty in performing the behavior of interest" (Ajzen, 1991). Perceived behavioural control is based on an individual's beliefs with regard to opportunity and resource availability or the level to which internal and external factors may enable or hamper a specific behaviour (Ajzen, 1991; Taylor & Todd, 1995). In the modified DTPB, those internal and external antecedents to perceived behavioural control are represented correspondingly as self-efficacy and facilitating conditions or *institutional supports*. Institutional supports represent the resources necessary to partake in a behaviour including time, money, technology, plus any necessary technical or organizational supports (Taylor & Todd, 1995). Previous research has shown a higher level of perceived behavioural control to have a strong impact on an individual's behavioural intention in the implementation and use of information technologies (Ajjan & Hartshorne, 2008; Lau, 2011; Taylor & Todd, 1995).

Subjective norms. Ajzen and Fishbein (1980) refer an individual's "perception of the social pressures put on him to perform or not perform the behavior in question" (p. 6). If individuals believe that people who are important to them think they should undertake a specific behaviour, it will increase those individuals' intention to do so (Ajzen & Fishbein, 1980). In the modified DTPB implemented in this study, subjective norms are derived from, *peer and*

institutional influences which take into account the influences that students, peers, administrators or superiors may have on individual faculty. (Taylor & Todd, 1995). While Ajjan and Harshorne (2008) did not find subjective norms to influence behavioural intention in their study, Taylor and Todd (1995) posit that subjective norms do hold significant determinant properties regarding behavioural intention. This is further supported by Lau (2011) who found a direct positive impact on behavioural intention from subjective norms.

Attitudes

Attitudes toward behaviour can be defined as the "degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188).   In the DTPB, attitude is constructed from three antecedent components, *compatibility*, *perceived ease of use*, and *perceived usefulness* (Taylor & Todd, 1995). These three components are shown to have a direct effect on attitudes toward a behaviour and it follows that as each of those three antecedents becomes more positive toward a new technology the corresponding attitudes toward adopting that technology should become more positive (Taylor & Todd, 1995). Davis et al., (1989) found to the contrary, that if an adoption of a technology is required as a condition of employment or part of an individual's job description, that individual will be more likely to adopt the technology regardless of their attitudes toward it. Furthermore, Rogers (2003) states "the formation of a favorable or unfavorable attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection decision" (p. 176). While attitudes have a direct influence on behavioural intention, that influence is not necessarily as strong as the indirect effect of compatibility, perceived ease of use, and perceived usefulness (Taylor & Todd, 1995).

Perceived usefulness. Davis et al. (1989) define perceived usefulness as an individual's

"subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p. 985). In their study of competing models for understanding information technology usage, Taylor and Todd (1995) found that perceived usefulness can be directly affected by perceived ease of use further supporting Davis (1986) in his claim that "all else being equal, a system which is easier to use will result in increased job performance" (p. 26). This assertion was also advanced by Venkatesh and Davis (2000) in their study, in which they found that perceived ease of use directly determined perceived usefulness. Similarly, Divett and Henderson (2003) further supported this assertion in their study where they found that perceived ease of use contributed to attitudes toward a behaviour through perceived usefulness. For this study, the DTPB includes a fourth modification to indicate perceived ease of use as a determinant of perceived usefulness. Venkatesh and Davis (2000) further found that subjective norms influenced perceived usefulness in a significant manner.   Accordingly, a fifth modification was made to the DTPB for this study to include subjective norms as a determinant of perceived usefulness. Supporting research shows that perceived usefulness has a direct impact on attitude (Taylor & Todd, 1995; Ajjan & Hartshorne, 2008; Lau, 2011).

Perceived ease of use. Rogers (2003) defines an innovation's complexity as the level to which it is perceived as complicated or difficult to comprehend and use. "New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings" (Rogers, 2003, p. 16). The concept of complexity in innovations parallels that of perceived ease of use defined in Davis (1989) as the level to which a specific technology is free of difficulty or effort. Davis asserts that individuals are more likely to accept and use applications that are perceived to be easier to use than others. The DTPB indicates perceived ease of use as a direct determinant of attitude. This is supported by some

research that has shown perceived ease of use to be an essential factor in technology adoption

decisions by directly affecting an individual's attitude toward an adoption (Ajjan & Hartshorne,

2008; Huang & Jabor, 2011). This finding has been further supported in studies that found

similar results and also found that perceived ease of use to be an antecedent of perceived

usefulness (Divett & Henderson, 2003; Venkatesh & Davis, 2000) and is reflected in the

modified DTPB used in this study.

      Compatibility. Compatibility is defined as "the degree to which an innovation is

perceived as being consistent with the existing values, past experiences and needs of potential

adopters" (Rogers, 2003, p. 240).   Tornatzky and Klein (1982) posit that compatibility can be

interpreted in two different ways; compatibility with the values of an individual, or compatibility

with the current way of doing things. It is this second interpretation that best fits the definition

of compatibility in this study in that it "suggests a more practical or operational compatibility

(compatibility with what people do)" (Tornatzky & Klein, 1982, p. 33). In her study, Lau (2011)

found that compatibility positively affected attitude in that the participants in the study felt the

technology being introduced supported key elements of their job in the same ways as the

traditional methods. The modified DTPB places compatibility as the degree to which faculty see

Web and digital technologies supporting teaching and learning in a positive way, in line with

their current way of doing things supported by their beliefs and values regarding their teaching

practice. *Institutional norms* are shown to be a determinant of compatibility in the modified

DTPB. Institutional norms are those standards or expectations of behaviour considered

acceptable within an organization (Dacin, 1997; Yew Wong & Boon-itt, 2008). In this study, the

institutional norms would be reflected by the level to which any given college positions itself

with regard to the implementation of Web and digital technologies in teaching and learning.

Faculty may feel a pressure to fit into the institutional norm, or standard of performance of the college. Such a standard may prove to be incompatible with their current practice or their beliefs and values with regard to their teaching practice thus having a negative effect on compatibility. Although interpretations of compatibility differ, some studies have shown a relationship between compatibility and an individual's propensity to form a positive attitude toward technology adoption in their job (Tornatzky & Klein, 1982; Rogers, 2003; Ajjan & Hartshorne, 2008; Lau, 2011).

Guiding Research Questions

Using the modified decomposed theory of planned behaviour (DTPB) as a framework, ten overarching questions were developed in an attempt to refine the research question, "What factors influence college faculty to adopt digital technologies in their practice?" The following questions are aimed at learning more about the intrinsic and extrinsic factors that were revealed through the review of existing research that may have a positive or negative affect on adoption. The questions each fall into one of five general areas: (a) assessment of current levels of technology adoption into teaching practices; (b) the effect of group dynamics in an adoption; (c) personal motivators for an adoption; (d) necessary support and training for an adoption; and (e) recognition to reward and support an adoption.

1. What is the current level of use of digital technologies in college faculty teaching practices?

2. What digital technologies are college faculty currently using in their teaching practices?

3. Do college faculty see added value for themselves, their students, and/or their institution in adopting digital technologies in their practices?

4. What, if any, digital technologies do college faculty perceive as useful in their practice to

them, their students and/or the institution?

5. What factors affect the decision by college faculty to implement digital technologies into their teaching practices?

6. What institutional supports or rewards might be required for college faculty to adopt a digital technology in their practice?

7. What is the effect of college faculty members' peer groups on their motivation to adopt digital technology into their practice?

8. What pressures to adopt digital technologies are present, from institution, administrators, or peers?

9. Can the adoption of a digital technology into one's teaching practice spark a transformation of approach to teaching and learning?

10. Can the successful adoption of a digital technology into one's teaching practice initiate further adoption through a transformation of attitudes toward the use of digital technologies in teaching and learning?

These ten questions served as a the basis for development of two data collection tools in an effort to build an understanding of factors that influence college faculty in deciding to adopt, or not to adopt, digital technologies in their practice.

Methodology

Participants

During the spring and summer semesters and ending in October of the fall semester of 2013 a survey was conducted with the aim of building an understanding of the factors that influence college faculty in deciding to adopt, or not to adopt, digital technologies in their practice. Participants to the survey were invited from four Ontario community colleges,

Confederation College, a small, rural college in northern Ontario, Durham College, a medium to

large college in Durham Region just east of Toronto and two large city colleges, Centennial

College and Seneca College, both in Toronto. These four colleges represented a wide range of

disciplines and college programs which allowed for access to a variety of teaching and learning

environments and a breadth of faculty experiences as well as years of teaching. Prospective

participants to the survey were invited through email by a representative from each of the centers

for teaching and learning at each of the four colleges. The survey was completely voluntary and

was open to all faculty at all four colleges including full-time, contract which is termed *sessional*

in Ontario colleges, and part-time or partial load. The approximate Ontario college faculty

staffing compliment and survey response is displayed in Table 1.

Table 1

Online Survey Target Population and Response

College	Teaching staff	Number of responses			
		Male	Female	Incomplete	Overall
Confederation	496	13	21	2	36
Durham	884	61	92	18	171
Centennial	895	20	24	3	47
Seneca	1884	11	31	7	49
Totals	4159[a]				303
				30	-30
		105	168		*n*=273

Note. Staffing levels obtained from MacKay (2014).

[a] Staffing numbers are approximate due to regular fluctuation in part-time, partial load and

sessional staff at each college, each semester.

Three hundred and three individuals responded to the survey invitation with four

declining to participate in the survey beyond reading the introduction and consent. A further 26

individuals consented to begin the survey but left the survey incomplete at various stages of the

first section of the survey prior to answering any questions relating to their own adoption of

digital technologies. In total, 273 participants from all four colleges across all college disciplines

and a wide variety of college programs completed the survey. One hundred and five of the

participants were male and 168 were female. The ages of the participants varied from under 30

years of age to 50 and over with approximately half of the respondents reporting to be in the 50

and over range. Based on gender, this sample is not representative of the population of college

faculty in Ontario but based on age this sample is representative with approximately half of the

wider faculty population in the 50 and over range (D. Dobson, CEO CAAT Pension Plan,

personal communication, June 17, 2014). Regardless, this sample does allow a glimpse into the

factors to take into account in a faculty decision to adopt digital technologies for teaching and

learning (DTTL). A complete age profile of the survey respondents is represented in Figure 3.
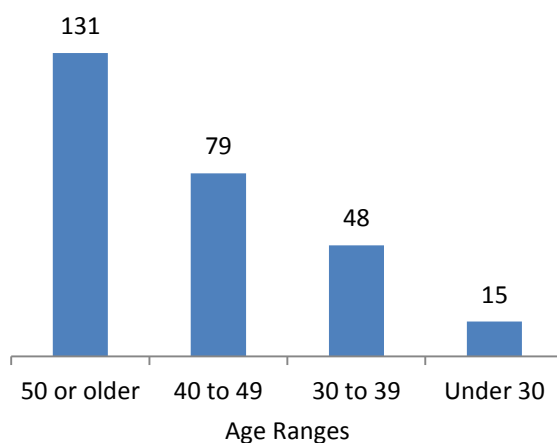
Figure 3. Participants' ages. Frequency count of participant age ranges by age range.

Accordingly, the respondents' years of teaching experience varied greatly from less than

one year to 30 years' experience across full-time, part-time and sessional faculty. A complete

experience profile of all respondents is illustrated in Figure 4.
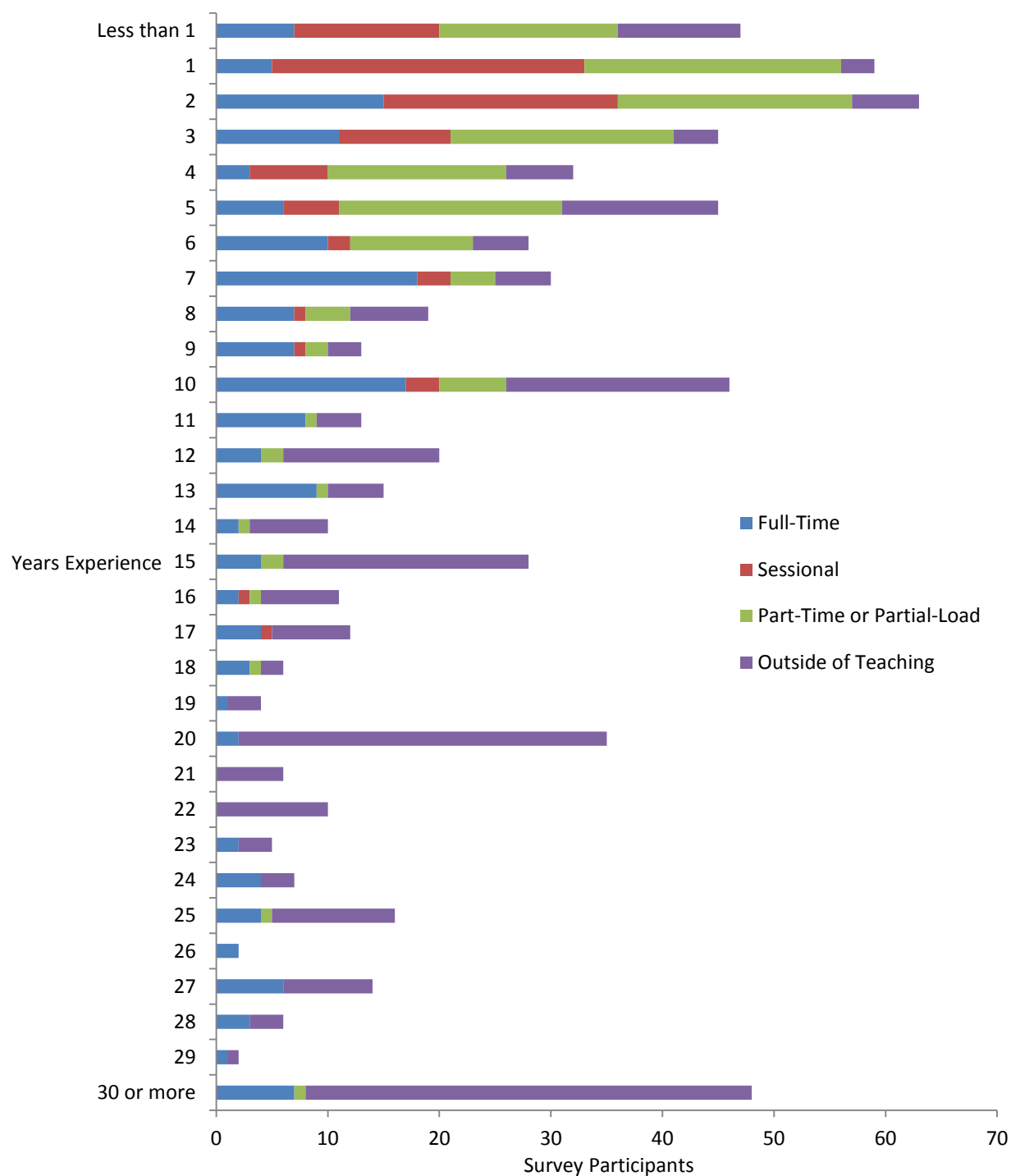
Figure 4. Participants' years of experience. Years of experience ranging from less than one year to 30 or more years as reported by participants for each classification of employment they have served in.

College faculty are typically hired for a particular subject matter expertise which could then be required by a variety of different program areas and schools within a college. The participants in this study reported teaching in a wide variety of program areas as displayed in Figure 5 including: applied arts, business and management studies, emergency services, fine art and design, general arts and sciences, health sciences, hospitality and tourism, human services, information and communications technology, justice studies, media and communications arts, science and technology, and skilled trades and apprenticeship.
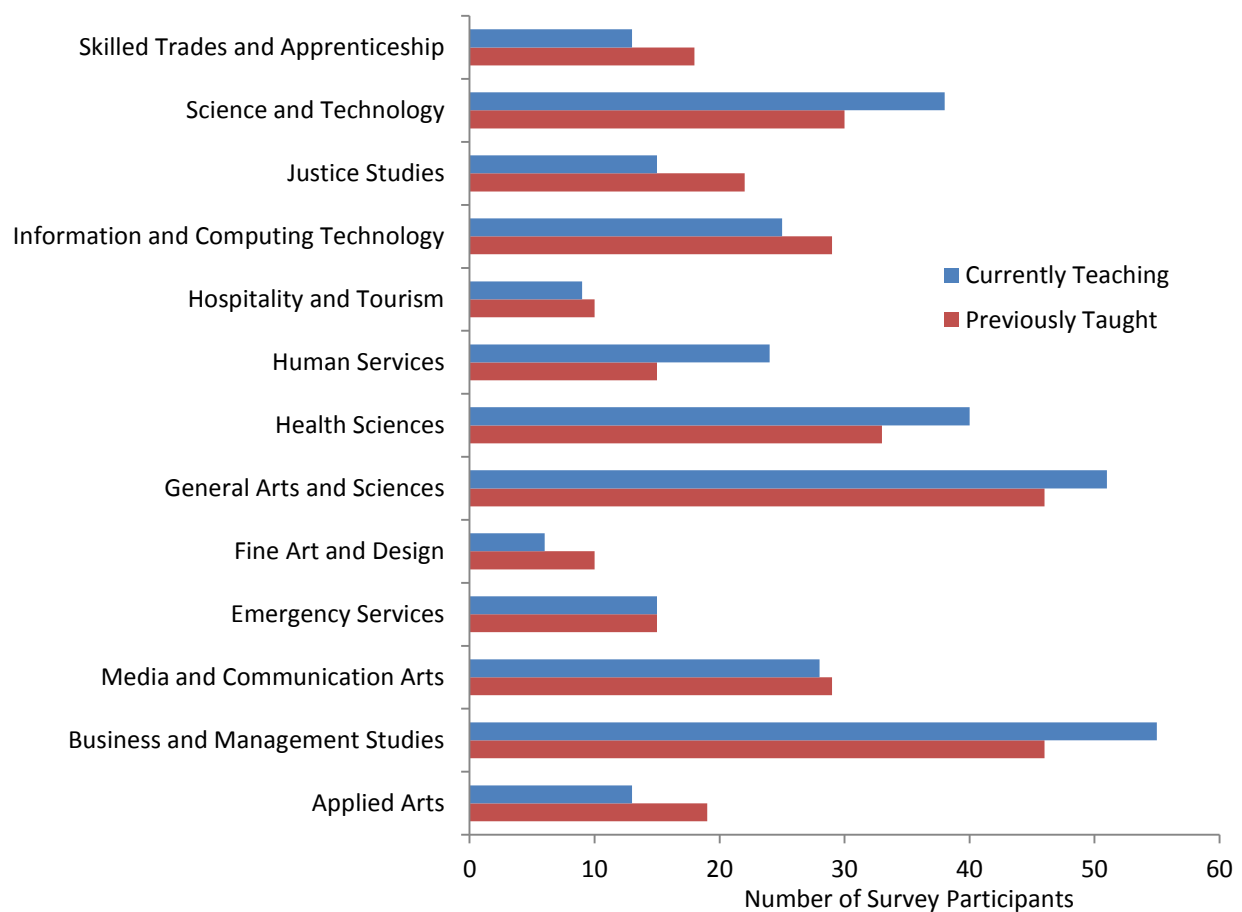
Figure 5. Program areas taught in by participants. College program areas indicating the number of participants reporting for each program area they currently teach in and any they previously have taught in.

The depth and breadth of experience reported by the 273 participants who completed the survey

provided a rich repository of data with faculty reporting varying levels of comfort with, and adoption of, digital technology in their day-to-day practice.

During three weeks in the spring semester of 2014 a smaller group of 14 faculty members from three of the four colleges took part in individual, qualitative interviews. One hundred and thirty two survey participants had submitted their names and contact information indicating their interest in taking part in the interviews which far exceeded the capacity of the researcher to complete interviews in the time allotted for interviewing. The responses by all potential interviewees to the open-ended questions on the survey were reviewed for in an effort to compile a list of willing participants that included champions of digital technologies for teaching and learning (DTTL) adoption, regular users of DTTL, and resistors or cautious adopters. With an aim to interview 8-10 individuals, an email invitation was sent out to 32 of the 132 who presented through their survey responses a mix of part-time, sessional and full-time with widely ranging years of teaching experience, across a range of college subject matter and varying degrees of DTTL adoption. The final list of 14 interview participants emerged based on each one's availability to be interviewed. The five males and nine females who came forward represented a diversity of teaching experiences and levels of adoption of digital technologies in their practices.

Procedure

All full-time, sessional and part-time faculty from the four Ontario community colleges were invited to complete the voluntary survey aimed at determining the extent of, and motivators for, their adoption of digital technologies in their practice. The invitations to participate were sent directly to each instructor from teaching and learning technology specialists at each of the four colleges using their institution's contact list and email. The email outlined the scope of the

survey along with information informing potential participants that their responses to the survey

would be anonymous and that their participation in the survey was completely voluntary.

Contained in the email was a link to the online survey which was hosted by SurveyMonkey.

Further, potential participants in the survey were informed that the purpose of the study was to

identify influencing factors that might lead to adoption of DTTL by faculty at community

colleges. Initial testing of the survey revealed that the entire survey should take no longer than

10-15 minutes to complete. Included at the end of the survey was a request for contact

information from participants who were willing to participate in an interview to be conducted at

a later date.

One hundred and thirty two survey respondents indicated a willingness to take part in the

follow up interviews. Of that group, 14 individuals took part in interviews that were conducted

in May 2014. The participants interviewed came from a longer list of potential interviewees who

were selected based on their survey responses with a goal of interviewing a variety of individuals

who had, and individuals who had not, adopted technology into their practice. Five of the

selected interview participants had indicated through their survey responses that they were

leaders or champions of adoption at their college. Three interviewees where selected based on

survey responses that indicated that they may be reluctant to adopt additional digital technologies

into their practice beyond what they already had or that they had experienced an unfavourable

result or negative feedback with regard to a previous attempt at adoption. The next five

interview participants were selected because their survey responses indicated that they regularly

used digital technologies in their practice and seemed quite interested in continuing to improve

their skills and their teaching practice through the use of digital technologies. The single

remaining interview participant was selected based on survey responses that potentially placed

this individual into the category that Rogers (2003) described as *laggards* or resisters to

adoption. This was an unanticipated, yet welcome, surprise as it was not expected that someone

with such a high level of resistance would take the time to fill out an online survey on their usage

of digital technologies. It was discovered during the course of the interviews that two of the

interviewees had recent experience at two other colleges; with one of those two currently

teaching part-time at two of the colleges included in the study thus providing an even greater

breadth of experiences to draw upon.

The semi-structured, individual face-to-face interviews took between 30-45 minutes each

and the mode of each interview was up to the interviewees. Eleven of the interview participants

opted for meeting in person and the remaining three participants were interviewed during a

Skype video call. All interviews were recorded using a digital audio recorder thus producing an

.mp3 file for each individual interview. Before each interview began, the interviewees were

provided with an introduction letter that again outlined the purpose of the study along with a

statement reiterating that their participation in the interviews was completely voluntary. The

interview introduction letter also provided information to the interviewees regarding the handling

and storage of the interview recordings. Specifically, all interview data would be held in the

strictest confidence by the interviewer; identifying names or other characteristics would not

appear in any findings reported as a result of information gathered during an interview. Further,

the digital recordings and transcriptions would be encrypted and stored on a password protected

hard drive and all interview data would be destroyed five years after publication of the findings

of the study. The last section of the interview introduction letter allowed for participants'

signatures indicating their informed consent to the interview. Once informed consent was given,

the interviewer started the recorder and began with a brief introduction, followed by a request to

begin the interview. The interviewees were not provided with the questions in advance of the interview; sufficient time was allotted for responses as necessary throughout each interview.

Instruments

Online survey. The online survey, which can be found in Appendix A, is comprised of five sections. The first section contains five identification questions for the purpose of describing each participant in terms of: gender; age; years of teaching experience full-time, sessional and part-time; and program areas that they currently teach in or have taught in.

The second section contained five selection matrices based on the first two guiding research questions. This section was designed to determine the types of, and current level of use of, digital technologies for teaching and learning (DTTL) by each respondent in five categories; (a) communicating with students, (b) delivering learning materials to students, (c) assessing students, (d) providing feedback to students, and (e) managing student grades.

The selection matrix for communicating with students asked the participants to indicate their level of use of a variety of communications tools measured against a four-point Likert scale including never, once a month or less, a few times a month to once a week, and more than once a week to daily. The communications tools provided for selection in this question included (a) email, (b) instant or text messaging, (c) discussion boards, (d) video conferencing, (e) Facebook, (f) LinkedIn, and (g) Twitter.

The three selection matrices provided for delivering learning materials, assessing students and providing feedback all provided the participant with a number of possible teaching and learning instruments aligned to the theme of the question in each matrix. For each instrument listed in these three matrices respondents were prompted to select any and all DTTL tools that they use or have used in their practice including (a) institutional LMS, (b) personal course Web

page, (c) email, (d) wiki, (e) video conferencing, (f) podcasts, (g) vodcasts, and a final option

allowing for no tool use (h) do not provide this type of instrument using DTTL.

The last selection matrix in this section asked participants to indicate their level of use of

a variety of grade management tools using a three-point Likert scale allowing for responses of

never use, have used, or use regularly. The grade management tools included in this matrix were

(a) institutional LMS, (b) intranet grade book, (c) licensed spreadsheet software package, or (d)

Web-based software. All three usage matrices in this section of the survey provided additional

space for respondents to enter the details of any other DTTL tools they use or any other teaching

and learning instrument they provide using DTTL other than what was listed in those matrices.

The third section of the survey was designed to address the remaining eight guiding

research questions using the modified decomposed theory of planned behaviour (DTPB) as a

framework. The 24 items found in this section of the survey were adapted from existing studies

(Taylor & Todd, 1995; Ajjan & Hartshorne, 2008; Huang & Jabor, 2011) and concentrated on

determining a respondent's belief system with regard to the adoption of DTTL into each

respondent's practice. Each item in this part of the survey allowed for responses measured

against a five-point Likert scale with levels of agreement including disagree, slightly disagree,

neutral or not applicable, slightly agree, and agree. The modified DTPB incorporates the

following factors:

- institutional norms,

- compatibility,

- perceived ease of use,

- perceived usefulness,

- attitudes,

- peer and institutional influences which determine,

- subjective norms,

- resources and other institutional supports,

- perceived behavioural control,

- self-efficacy, and

- behavioural intention.

Individual questions in this section of the survey were each aligned to one discrete factor from the modified DTPB with the intention of gaining insight into those factors that may influence faculty to adopt, or not to adopt, digital technologies for teaching and learning (DTTL) into their teaching practice. The complete list of questions from this section of the survey aligned to individual factors from the modified DTPB is presented in Table 2.

Table 2

Section Three Survey Questions Aligned to Framework

Factor	Question
Institutional norms	
IN-1	My college believes it is important that I incorporate the use of DTTL into my teaching practice.
IN-2	Administration at my college is well informed on the use of DTTL in teaching and learning.
Compatibility	
C-1	The strategies being implemented at my college to increase the use of DTTL in teaching and learning are in line with my own professional needs and beliefs.
Perceived ease of use	
PEU-1	Incorporating DTTL into my teaching practice is difficult.
PEU-2	I feel overburdened when I'm asked to incorporate the use of DTTL into my teaching practice.
PEU-3	When I decide to integrate the use of DTTL into my teaching practice I will have to seek out professional development outside of what my college makes available to me.
Perceived usefulness	
PU-1	As an instructor I believe the use of DTTL brings value to the classroom.
PU-2	My students believe the use of DTTL brings value to the classroom.
PU-3	I would recommend to my peers that they should consider further integration of the use of DTTL into their teaching practices.
Attitudes	
A-1	The use of DTTL improves the quality of the learning experience at my college.
A-2	The advantages of using DTTL outweigh any disadvantages.
Peer and institutional influences determining subjective norms	
ISN-1	My college encourages me to integrate the use of DTTL into my teaching practice.
ISN-2	My supervisor believes that I should further integrate the use of DTTL into my teaching practice.
ISN-3	My peers believe that I should further integrate the use of DTTL into my teaching practice.
ISN-4	My students believe that I should further integrate the use of DTTL into my teaching practice.
Resources and other institutional supports	
IS-1	My college IT department provides the support I need to integrate the use of DTTL into my teaching practice.
IS-2	My college has a teaching and learning resource center that provides adequate training to enable me to integrate the use of DTTL into my teaching practice.
IS-3	My college supports me with release time and/or professional development to integrate the use of DTTL into my teaching practice.
Perceived behavioural control	
PBC-1	Integrating the use of DTTL into my teaching practice is completely within my control.
Self-efficacy	
SE-1	I have the knowledge required to integrate the use of DTTL into my teaching practice.
SE-2	I feel comfortable using DTTL.
Behavioural intention	
BI-1	I plan to increase the use of DTTL in my classroom.
BI-2	I plan to further integrate the use of DTTL into my teaching practice in the next semester.
BI-3	I plan to further integrate the use of DTTL into my teaching practice in the next academic year.

The fourth section of the survey contained four open-ended questions intended to allow participants to more extensively outline their beliefs and attitudes toward the adoption of DTTL in their practices. The first two questions were aimed at building a further understanding of any perceived benefits to themselves or to their students in the adoption of DTTL by the respondent into their practice. In the third question, the respondent was asked to identify any specific needs they may have for administrative support or incentive in adopting DTTL. The final question allowed for the respondent to outline the key personal or institutional factor or factors that could motivate them to adopt, or adapt to, a new DTTL in their teaching practice.

The last section of the online survey provided the respondent with an opportunity to participate in the interview process whereby asking individuals to provide contact information should they elect to participate. Unless a respondent to the survey elected to participate in an interview, all responses to the survey were completely anonymous as there was no requirement for respondents to provide an email address or any other personal identifiers beyond the demographic and experience information which was requested in the first section.

Interviews. The interviews were semi-structured in design and included 12 open ended questions with three additional supplemental questions that were asked dependent upon the interviewees' previous responses. The questions, which can be found in Appendix B, like the online survey, were designed using the guiding research questions and the modified DTPB as a framework with the purpose of allowing each interviewee to fully express their personal comfort level with digital technologies and what factors led to their past, or impending, (DTTL) adoption decisions. Time was allotted for each interviewee to comment on what might motivate them to initiate a change, or further change, in their practice based on the introduction of DTTL.

Research Data

Survey Responses

The purpose of this study was to examine and build an understanding of factors that influence college teachers to adopt or not to adopt digital technologies in their practice. The goal was to develop a list of potential motivators for faculty to adopt digital technologies for teaching and learning (DTTL). The study was not intended to look at adoption or motivation to adopt by a population but focused on building that list of motivators using the modified decomposed theory of planned behaviour (DTPB) as a framework for classification of those motivators. Therefore, all survey data gathered on faculty DTTL usage and their views regarding the use of DTTL in their practice were examined using frequency measures. The objective of this approach was to obtain the range of levels of usage of various digital technologies by college faculty as well as their levels of agreement with the survey statements which were each associated with discrete factors defined in the modified DTPB.

DTTL usage. All 273 survey respondents participated in this section of the survey intended to elicit their levels of use of a variety of DTTL tools for communicating with students, delivering learning materials to students, assessing students, providing feedback to students, and managing student grades. This study is not focused on the behaviours of the larger population of college faculty in Ontario; rather its focus is on the development of a list of possible factors that may lead to adoption of DTTL in an individual faculty's practice. To gage the level of usage by this study group and the DTTL that they employ, a frequency measure was implemented for each category that indicates which tools they most often use for the various categories of teaching and learning instruments.

Additional space was provided for the respondents to report the details of any other

digital or non-digital tools they use as well as any other teaching and learning instrument they

provide to their students. In most cases this option provided only a duplication or clarification of

what was reported by a respondent in that matrix. For example, many respondents listed specific

tools found in their institutional LMS in this category as well as selecting that tool from the

matrix. There were many responses to all the matrices in this section where the respondent listed

the details of how they implemented a specific tool that they use for a particular teaching and

learning instrument where that tool was included on the matrix in a broader sense. For example,

when responding to the managing grades matrix, some participants who indicated that they use

the institutional LMS and licensed software would further outline how they would use the

licensed software to enter and maintain individual assignment grades and then upload those

grades to the LMS for weighted grade management.

   Communicating with students. Two hundred and seven of the 273 survey respondents

reported that they used email more than once a week to daily, ranking email as the predominant

tool for use in communicating regularly with their students (see Figure 6). Discussion boards

ranked second in usage with 77 reporting using the tool more than once a week to daily and a

further 75 using discussion boards a few times a month to once a week. Beyond those two tools

there was minimal usage among the group measured for any other tool other than instant or SMS

messaging which showed a 38 of the 273 respondents employing messaging tools for

communicating with students more than once weekly to daily. Most respondents reported no use

or very minimal use of video conferencing or social media tools such as Facebook, LinkedIn and

Twitter for communicating with their students. Fifty eight respondents reported using DTTL

tools other than those listed with many identifying components of their institutional LMS and a

small number reporting the use of YouTube, FaceTime, Instagram, wikis and a variety of

blogging tools. The results from the digital communications tool preference and usage matrix
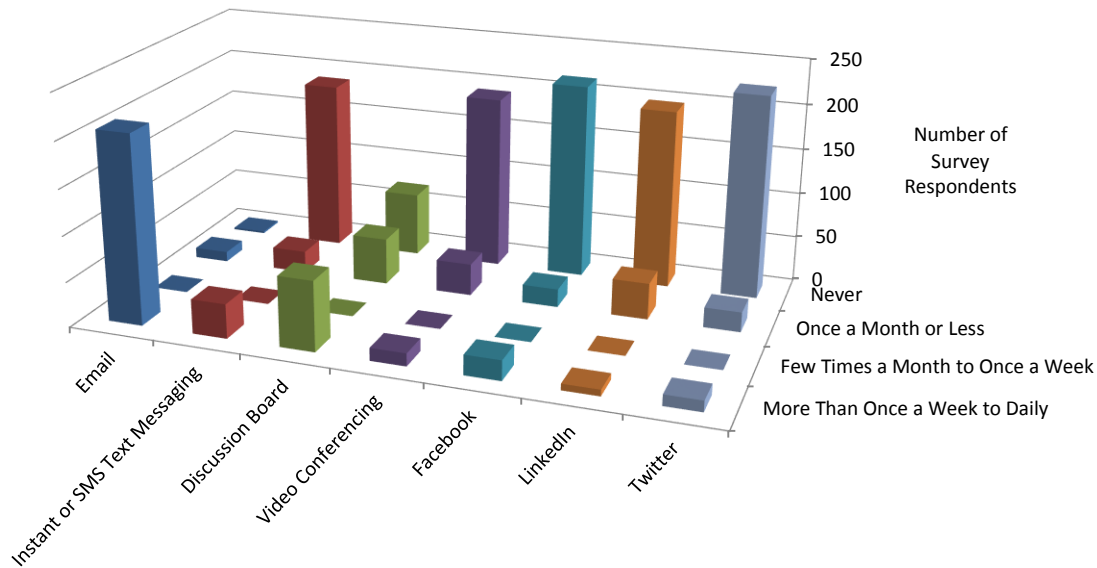
are presented in Figure 6.

Figure 6. Digital communication tools usage. Levels of use of various digital and Web

technologies employed by faculty for communicating with their students.

Delivering learning materials to students. As can be seen in Figure 7, the results from

this question indicate a strong preference by faculty in using the institutional LMS for delivering

a variety of learning materials. Two hundred and sixty seven of the 273 respondents reported

delivering outlines to their students using the institutional LMS. At the low end of LMS usage,

148 respondents indicated that the LMS is the preferred tool for providing demonstration

materials with the next closest ranking response for delivering demonstration materials being the

91 respondents who indicated that they do not use digital technologies for teaching and learning

(DTTL) for providing demonstration materials to students. Among the other DTTL tools listed

on this matrix, only email had responses indicating more than minimal usage for delivering

learning materials with sixty one faculty using email to deliver outlines, 43 delivering lecture

notes using email, 74 using email to deliver Web links and 60 faculty delivering example

problems and solutions using email. Vodcasts were the only other tool listed on this matrix that

showed a marked level of use by faculty with 53 reporting that they used vodcasts to deliver

demonstration materials. Personal course Web pages are used sparingly by some faculty leaving

wikis, video conferencing and podcasts at very low usage levels by faculty for delivering

learning materials. Forty eight of the 273 survey respondents reported a wide variety of other

types of learning materials and modes of delivery in addition to those included on the matrix.

Required readings, guided class discussions, publisher Web sites, discipline-specific Web sites

and specific components of the institutional LMS appeared for many as other modes of delivery.

The course textbook, handouts, videos shown in class were all listed as other types of learning

materials provided to students. The results from the learning materials digital delivery tool

selection and usage matrix are displayed in Figure 7.
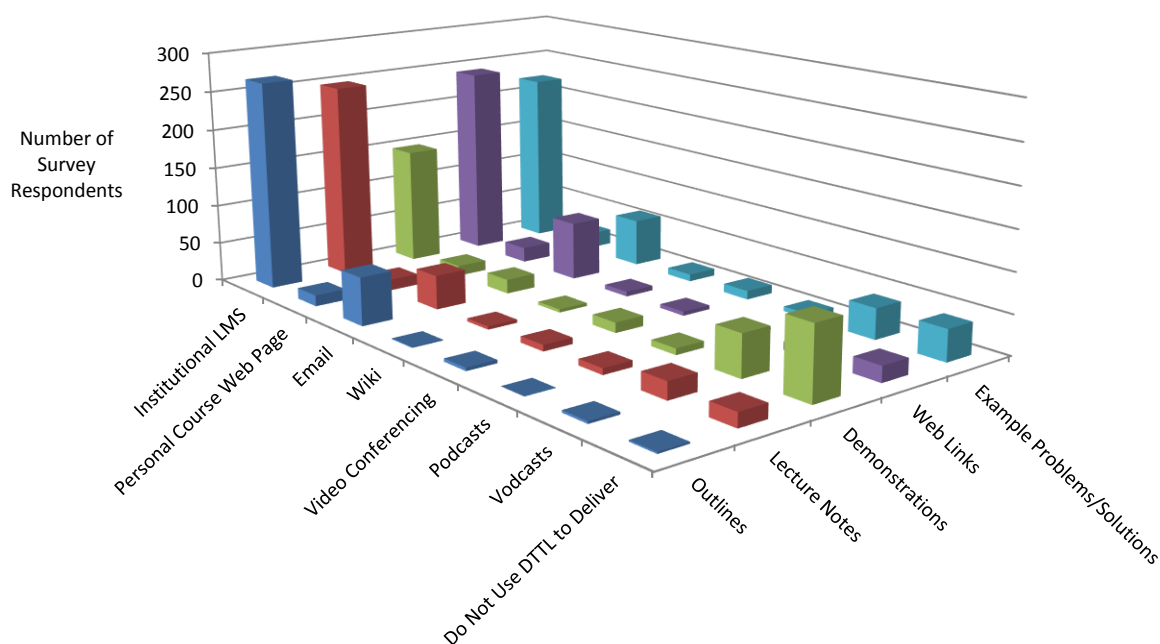
Figure 7. DTTL usage for delivering learning materials. Levels of use of various digital and

Web technologies implemented by faculty for delivering learning materials to their students.

Assessing students. Of the 273 responses the institutional LMS was rated as the clear

preference in DTTL for assessing students through surveys, quizzes or tests; assignments; class

discussions; and group work with response rates of 192, 214, 157, and 143 respectively as

illustrated in Figure 8. The second highest ranking selection for all assessment categories was

the category indicating the respondent did not use DTTL to deliver the listed assessments with

corresponding response rates of 74, 47, 108, and 121. The only DTTL tools beyond the

institutional LMS with usage levels of note were email followed by personal course Web pages.

All other technologies listed scored only single digit usage with wikis breaking that trend in one

category showing 10 faculty using the tool for group work. In addition, 33 respondents reported

using other modes of assessing their students, with many reporting assessing their students face

to face in class with tests and assignments while others listed specific components of the

institutional LMS along with publisher Web sites and discipline specific tools for assessments

such as Lyryx accounting software. Portfolios and presentations were listed as other types of

assessments provided to students. The results from the digital assessment tool selection and

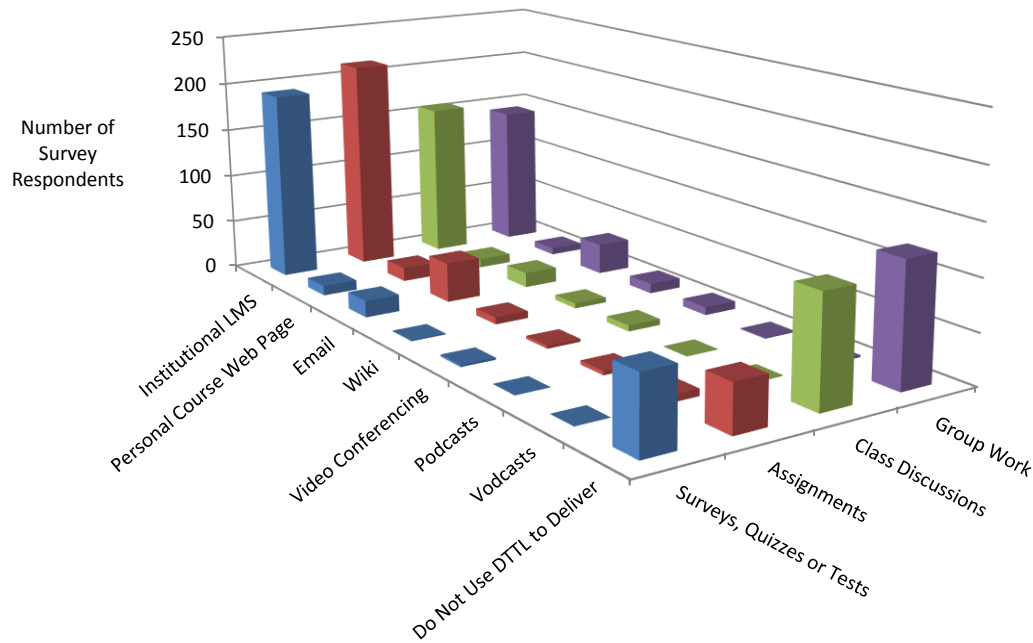usage matrix are displayed in Figure 8.

Figure 8. DTTL usage for assessing students. Levels of use of various digital and Web

technologies employed by faculty for assessing their students.

   Providing feedback to students. Grades, rubrics and comments on assignment

submissions are all modes of feedback that the clear majority of the 273 survey respondents

reported providing to students through the institutional LMS with response rates of 257, 205, and

179 respectively for those modes, as shown in Figure 9. This is the only selection matrix with a

category that showed more respondents not using digital technologies for teaching and learning

(DTTL) versus those who do use DTTL for peer and self-evaluation by a score of 138 to 121. It

also appears that providing comments on assignments and rubrics are two types of feedback that

many faculty do not provide to their students using DTTL with response rates of 61 and 66

correspondingly. Email again came out as the clear second choice for faculty for each type of

feedback provided, in particular for providing grades and comments on assignments with rates of

47 and 78 correspondingly of the 273 total respondents. Personal course Web pages had only

modest usage reported and all other tools showed only minimal usage in this matrix. Seventeen respondents reported using other tools for providing grades and assignment feedback, predominantly face-to-face and handwritten comments on assignments and tests. There were two instances of individuals who reported using publisher Web sites for managing grades and three respondents who listed specific wiki, vodcast and podcast tools they employ. The results from digital tool selection and usage for providing feedback matrix are presented in Figure 9.
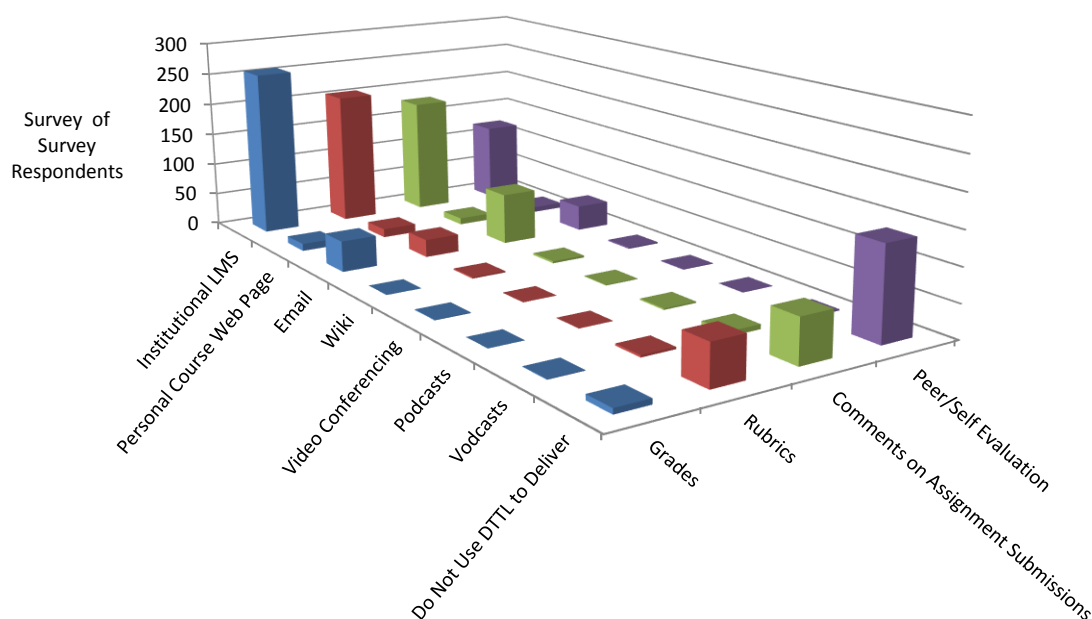
Figure 9. DTTL usage for providing feedback to students. Levels of use by faculty of various digital and Web technologies for providing feedback to their students.

Managing grades. Of the 273 responses, 244 indicated regular use of the institutional LMS grade book to manage students' grades. Additionally, 146 respondents indicated that they use licensed spreadsheet software to manage grades on a regular basis with a further 68 reporting that they have used licensed spreadsheet software for managing grades. After the LMS and licensed software, the intranet grade book appears to be the tool of choice for 57 respondents who use that tool to manage student grades on a regular basis. There was very little reported use

of Web-based spreadsheet software for managing grades with only 16 reporting that they use that tool on a regular basis with a further 34 indicating that they have used such software in the past. Overall 223 of the total 273 respondents have never used Web-based spreadsheet software and 185 reported never using an intranet grade book for managing student grades. Ten respondents reported using other means for managing grades yet those responses only indicated those participants' specific use of licensed and Web-based spreadsheet software packages and their institutional LMS. The results from the digital grades management tool selection and usage matrix are displayed in Figure 10.
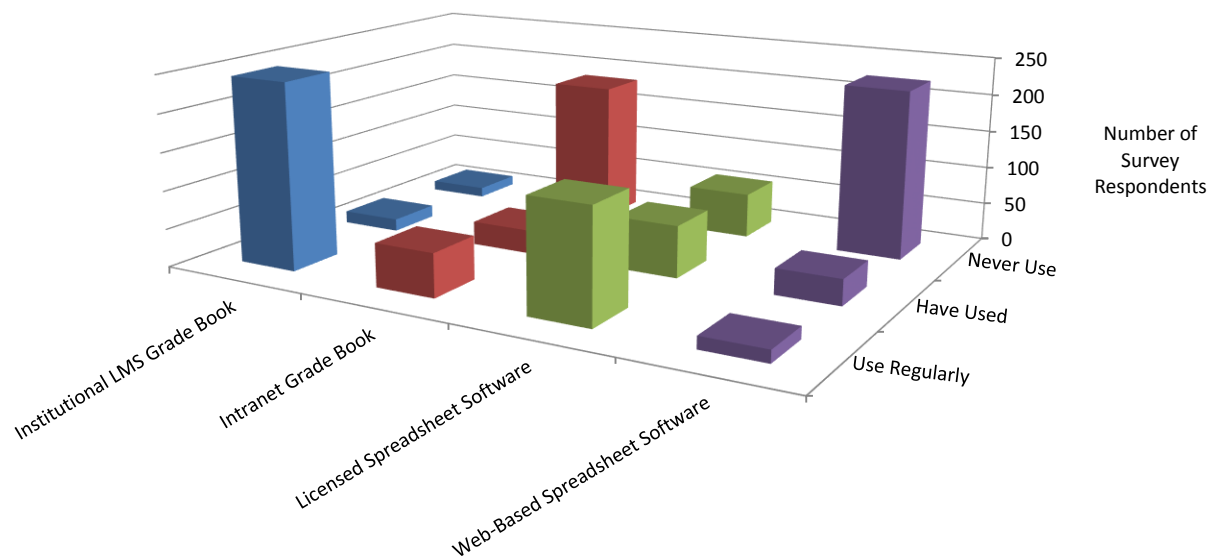
Figure 10. Digital grades management tools usage. Levels of use by faculty of various digital and Web technologies for managing their students' grades.

Views on the use of DTTL. Two hundred and sixty six survey participants responded to this section of the survey which focused on building an understanding of their views on the use of digital technologies for teaching and learning (DTTL) tools in their teaching practice. Participants were presented with a series of statements and asked to indicate their level of agreement, disagreement or indicate their neutrality for each statement. The statements were all

designed according to the last eight overarching research questions and each aligned to a specific

factor in the modified decomposed theory of planned behaviour (DTPB). In this study, where

the goal is to build a list of possible motivating factors that may lead to the use of DTTL in a

teacher's practice, these statements provided a means to measure the strength of individual

possible factors identified in the modified DTPB, the theoretical framework for this study.

Given that this study was not aimed at attempting to build an understanding of adoption

behaviours among all Ontario college faculty, rather the development of a list of possible factors

that might motivate college faculty to adopt DTTL into their practice, a frequency measure was

employed on the total responses for each statement in this section. This enabled an enumeration

of the respondents in agreement with each statement and their levels of agreement. In cases in

which more than one statement was employed to test the strength of a factor as a motivator that

could lead to adoption of DTTL in an individual faculty member's practice, those frequency

measures were assessed comparatively with one another. Although the sample size for this study

is inadequate for generalizing across a population it was sufficient to test the strength of each

factor. Those factors, as defined in the theoretical framework for this study, represent candidates

for the list of possible factors that could be explored to improve the level of adoption of DTTL

by college faculty in Ontario.

Institutional norms. With 168 of the 266 respondents agreeing with the statement "My

college believes it is important that I incorporate the use of DTTL into my teaching practice" and

a further 66 slightly agreeing, it seems clear among the survey respondents that their college

believes the use of DTTL in their practice is important as illustrated in Figure 11. Furthermore,

there were only four who disagreed and five who slightly disagreed with another 23 respondents

reporting neutral positions on the statement. Responses to the next statement, while somewhat in

line with the first institutional norm question with the majority of the 266 respondents in agreement, the level of agreement was not quite as strong and there was a marked increase in the levels of disagreement with the statement "Administration at my college is well informed on the use of DTTL in teaching and learning." This statement resulted in 78 in agreement with 75 slightly agreeing and 33 slightly disagreeing and a further 23 disagreeing with the remaining 57 respondents declaring neutrality on the statement. The results from the two statements aligned to the respondents' sense of their institutions' norms regarding the use of DTTL are presented in Figure 11.
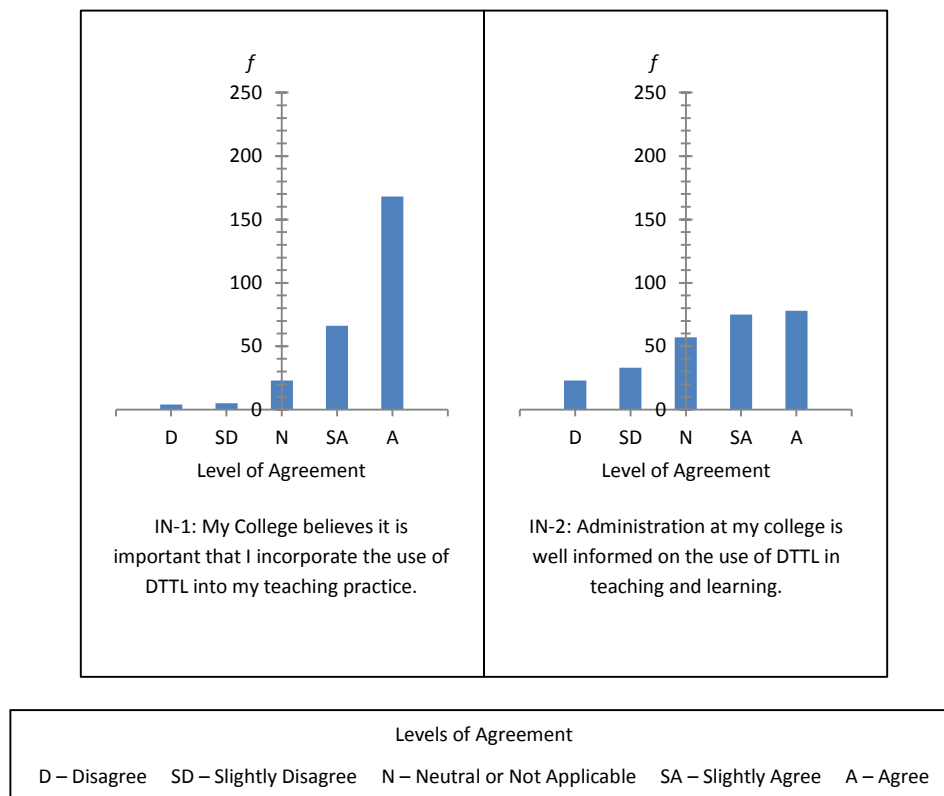
Figure 11. Responses to institutional norms statements. Frequency measure of agreement to the two survey statements aligned to the institutional norms (IN) factor originating from the modified DTPB.

Compatibility. Of the 266 survey respondents, 75 agreed followed by 79 who slightly agreed with the statement "The strategies being implemented at my college to increase the use of DTTL in teaching and learning are in line with my own professional needs and beliefs." While this level of agreement aligns well with the response to the previous institutional norm question (IN-2) there is a slightly higher level of disagreement with the compatibility statement that had 45 respondents slightly disagreeing along with a further 25 disagreeing. Forty two respondents indicated that they were neutral on the statement. The results from the compatibility statement regarding the use of DTTL are presented in Figure 12.

C-1: The strategies being implemented at my college to increase the use of DTTL in teaching and learning are in line with my own professional needs and beliefs.

Levels of Agreement

D – Disagree   SD – Slightly Disagree   N – Neutral or Not Applicable   SA – Slightly Agree   A – Agree
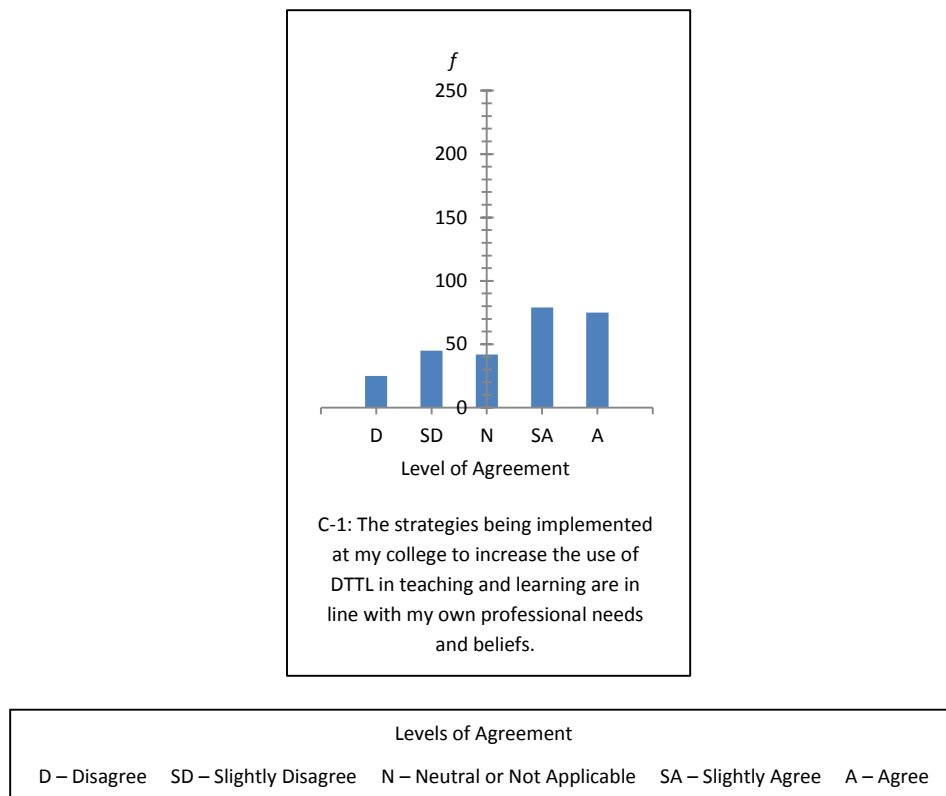
Figure 12. Responses to the compatibility statement. Frequency measure of agreement to the survey statement aligned to the compatibility (C) factor originating from the modified DTPB.

Perceived ease of use. Of the 266 respondents to this section of the survey it appeared that there is a split on opinion regarding the ease of incorporating digital technologies for teaching and learning (DTTL) into their practices as revealed in the first chart in Figure 13. When presented with the statement "Incorporating DTTL into my teaching practice is difficult" 27 respondents agreed and 88 slightly agreed with the statement. Seventy five respondents disagreed followed by 40 who slightly disagreed and a further 44 who were neutral on the statement. The next two statements aligned to the perceived ease of use factor from the modified DTPB, PEU-2 and PEU-3 resulted in very similar levels of agreement from the 266 respondents as displayed in the second and third charts in Figure 13. Specifically, 99 disagreed and 52 slightly disagreed that they would feel overburdened when asked to incorporate DTTL in their practice which was offset by 21 agreeing and 50 slightly agreeing with that statement followed by 44 who were neutral. In a similar fashion, 102 disagreed and 40 slightly disagreed that they would need to seek out professional development beyond what their college provides counterbalanced by 29 agreeing and 44 slightly agreeing followed by a further 51 who were neutral on that statement. The results from these three statements which aligned to the perceived ease of use of DTTL are presented in Figure 13.
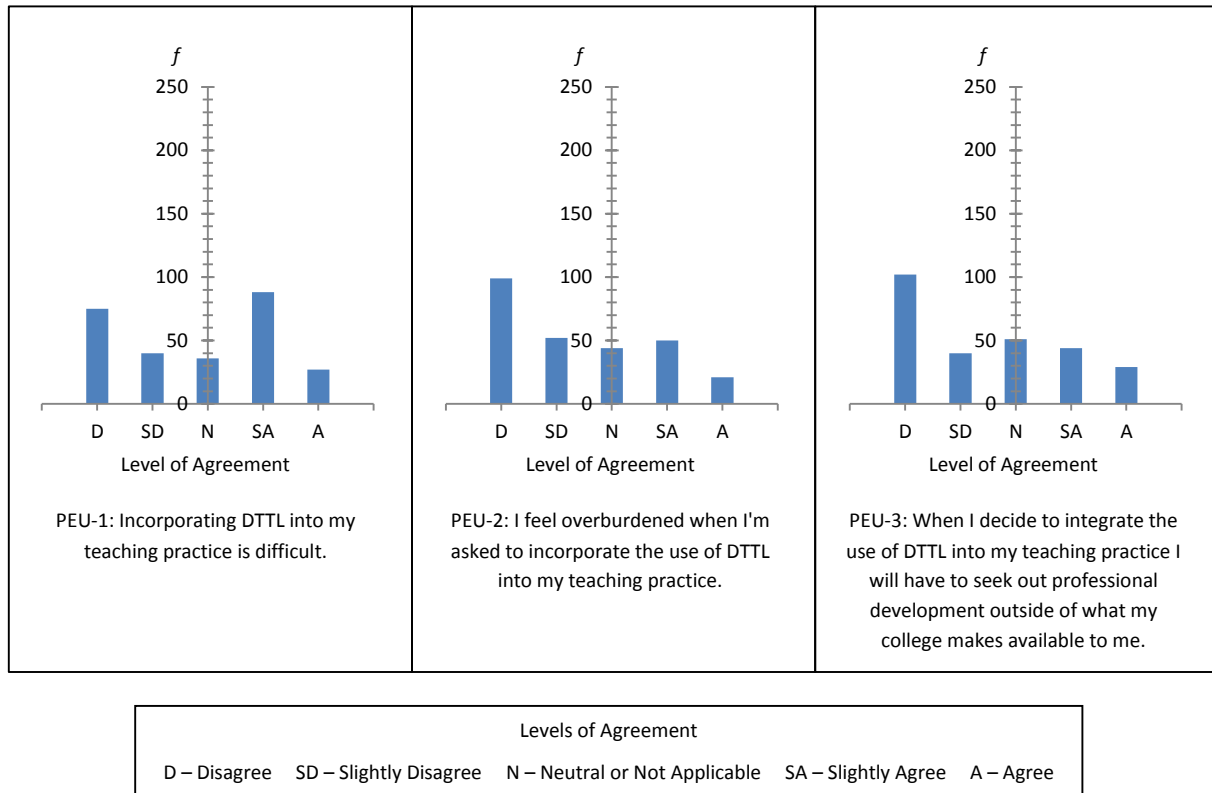
Figure 13. Responses to perceived ease of use statements. Frequency measure of agreement to the three survey statements aligned to the perceived ease of use (PEU) factor originating from the modified DTPB.

Perceived usefulness. Among the three statements regarding the perceived usefulness of DTTL the first two, PU-1 and PU-2, garnered the highest level of overall agreement (237 and 249 respectively) of all the statements in this part of the survey as illustrated in Figure 14. Presented with a statement of their own belief that the use of DTTL brings value to the classroom 213 of the 266 respondents agreed, with a further 36 slightly agreeing, leaving only eight slightly disagreeing, one disagreeing and eight remaining neutral on the statement. The statement "My students believe the use of DTTL brings value to the classroom" resulted in a very similar high level of agreement with 184 agreeing followed by 53 slightly agreeing with

that statement. This was the only statement in the survey that resulted in zero disagreement with

only five respondents indicating slight disagreement and 24 respondents remaining neutral. The

third perceived usefulness statement (PU-3), although not resulting in as strong agreement as the

first two, indicated a similar pattern with 117 in agreement, followed by a further 66 in slight

agreement with the statement "I would recommend to my peers that they should consider further

integration of the use of DTTL into their teaching practices." An additional nine disagreed, with

20 slightly disagreeing and 54 declaring neutrality on that statement. The results from these

three statements aligned to the perceived usefulness of DTTL are presented in Figure 14.
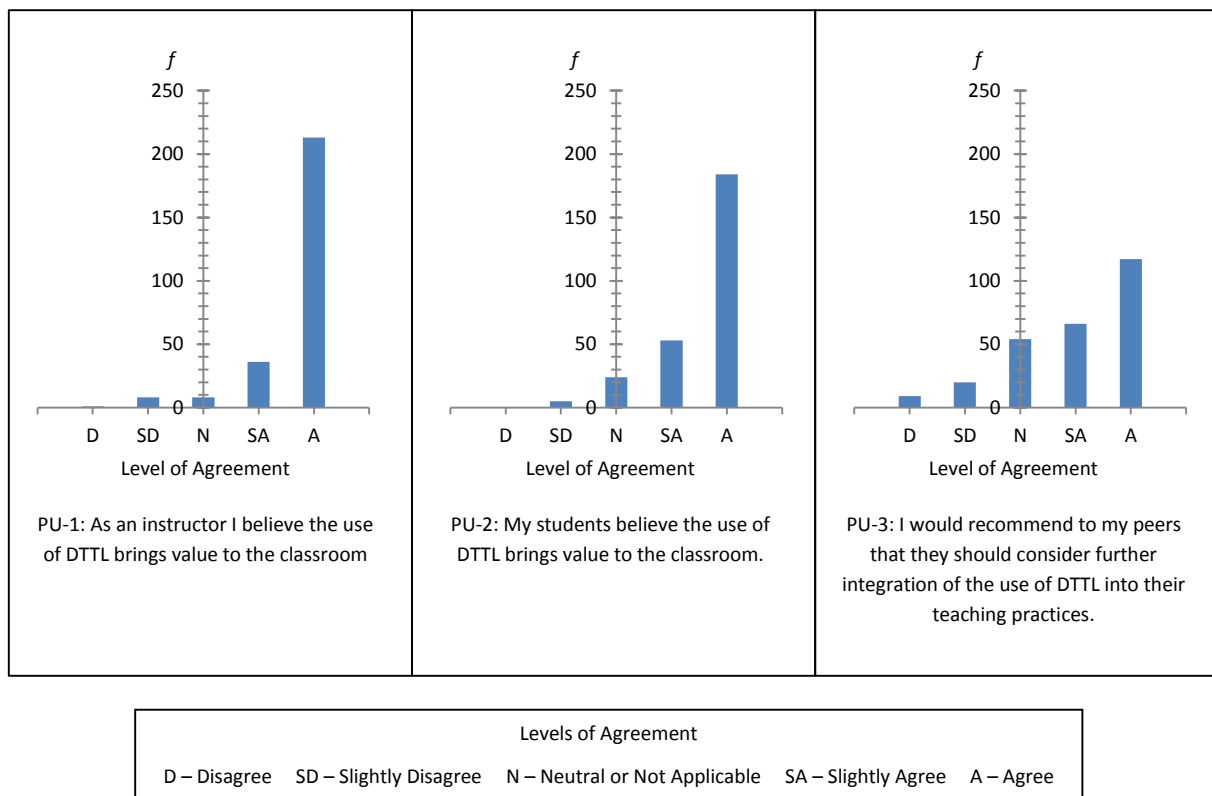
Figure 14. Responses to perceived usefulness statements. Frequency measure of agreement to

the three survey statements aligned to the perceived usefulness (PU) factor originating from the

modified DTPB.

Attitudes. As illustrated in Figure 15 the level of agreement was quite high in response to the two statements, A-1 and A-2 regarding survey participants' attitudes to the use of digital technologies for teaching and learning (DTTL). The statement "The use of DTTL improves the quality of the learning experience at my college" garnered overall agreement from 233 of the 266 respondents to this section of the survey with 177 of those in agreement and 56 slightly agreeing with the statement. There were four who disagreed with this statement followed by eight who slightly disagreed and 21 who were neutral. Similarly, in response to the statement "The advantages of using DTTL outweigh any disadvantages" 209 participants overall were in agreement with 141 agreeing and 68 who slightly agreed, followed by eight who disagreed, 16 who slightly disagreed and 33 who remained neutral on this statement. The results from the two statements aligned to the respondents' attitudes toward DTTL are presented in Figure 15.

A-1: The use of DTTL improves the quality of the learning experience at my college.

A-2: The advantages of using DTTL outweigh any disadvantages.

Levels of Agreement

D – Disagree   SD – Slightly Disagree   N – Neutral or Not Applicable   SA – Slightly Agree   A – Agree
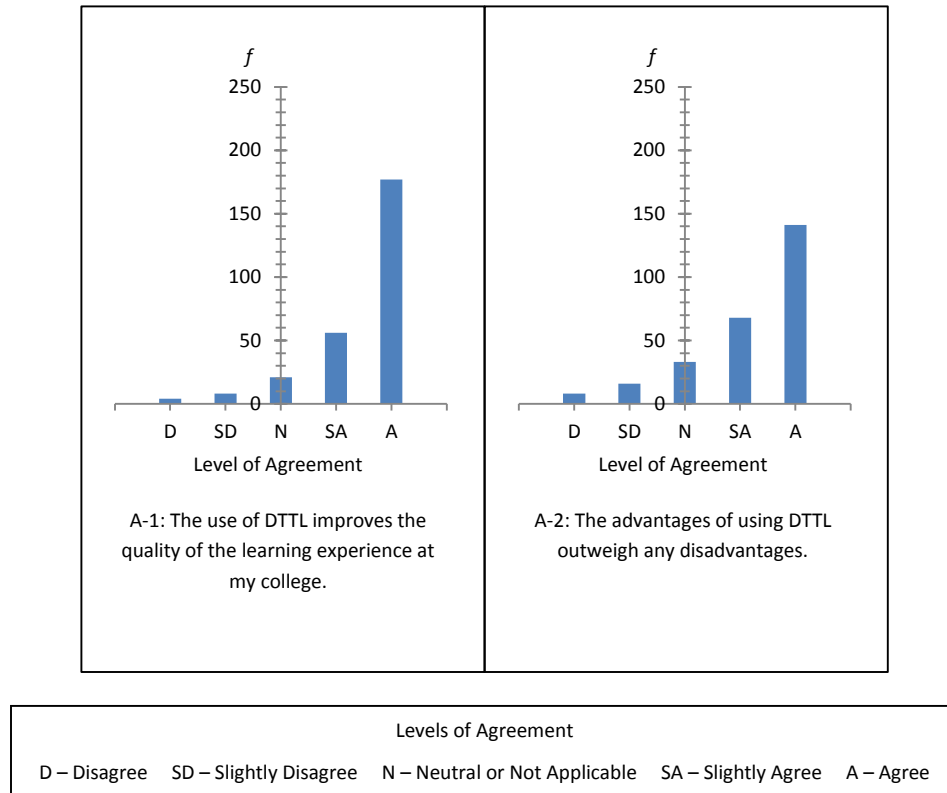
Figure 15. Responses to attitudes statements. Frequency measure of agreement to the two survey statements aligned to the attitudes (A) factor originating from the modified DTPB.

Peer and institutional influences determining subjective norms. There were four statements intended to assess the strength of various influences on respondents' subjective norms. The first statement "My college encourages me to integrate the use of DTTL into my teaching practice" resulted in a high level of agreement as can been seen in Figure 16. Two hundred and thirty three of the 266 respondents were in overall agreement with 153 who agreed and an additional 70 who slightly agreed with the statement and only five disagreeing, followed by 11 in slight disagreement with this statement and a further 27 respondents indicating neutral. The results from the statement aligned to the influences of the institution in determining the respondents' subjective norms regarding DTTL are presented in Figure 16.

ISN-1: My College encourages me to integrate the use of DTTL into my teaching practice.

Levels of Agreement
D – Disagree   SD – Slightly Disagree   N – Neutral or Not Applicable   SA – Slightly Agree   A – Agree
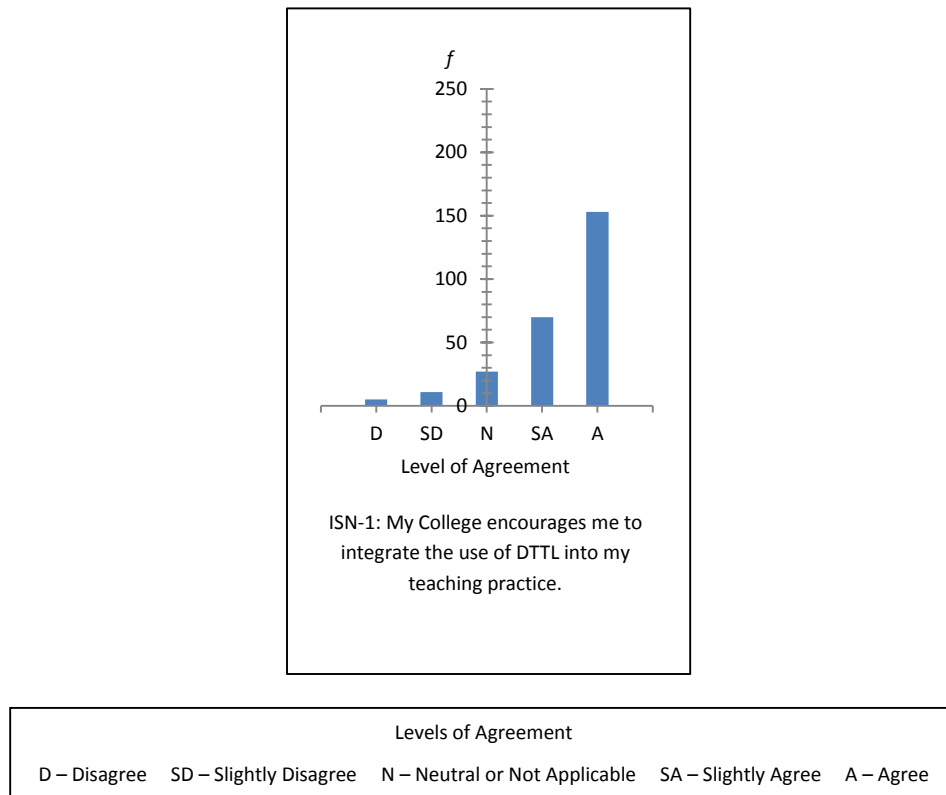
Figure 16. Responses to the institutional influence on subjective norms statement. Frequency measure of agreement to the survey statement aligned to the institutional influence on the subjective norms (ISN) factor originating from the modified DTPB.

The next three statements related to influences on subjective norms, ISN-2, ISN-3, and ISN-4 resulted in differing responses from the first statement related to influences on subjective norms yet these three sets of responses were similar to one another in the levels of agreement registered as illustrated in Figure 17. These three statements related to the influences of respondents' supervisors, faculty peers and students on the subjective norms of the respondent. With regard to respondents' supervisors, 65 agreed and 56 slightly agreed with the statement "My supervisor believes that I should further integrate the use of DTTL in my teaching practice" with 15 disagreeing, 19 slightly disagreeing and 111 indicating neutral on the statement. When

presented with a similar statement regarding the respondents' peers belief that the respondent

should further integrate DTTL in their practice 36 agreed, 55 slightly agreed, 32 disagreed, 30

slightly disagreed and 113 remained neutral on that statement. Following a similar pattern, the

statement "My students believe that I should further integrate the use of DTTL into my teaching

practice" 62 respondents agreed with 59 slightly agreeing followed by 17 who disagreed, 31 who

slightly disagreed and 97 who indicated neutral on that statement. The results from the three

statements aligned to the influences of administrators, faculty peers and students in determining

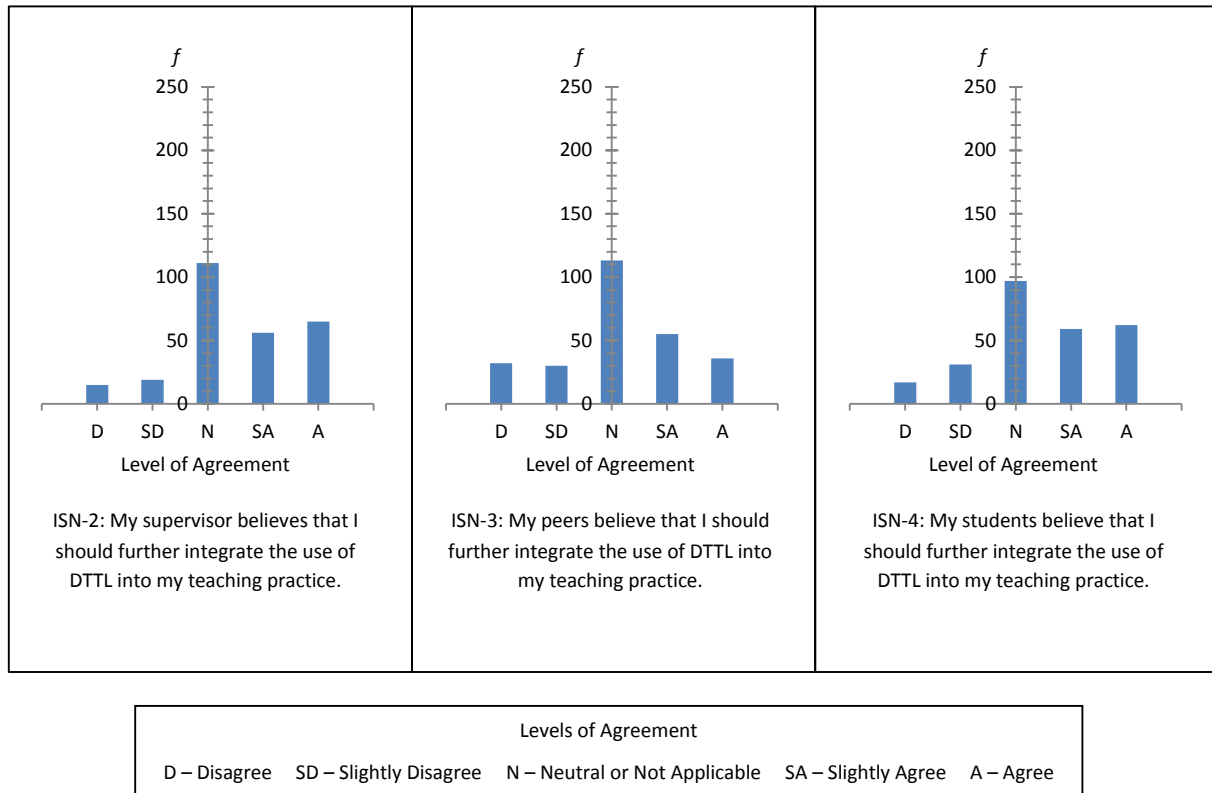the respondents' subjective norms regarding DTTL are presented in Figure 17.

Figure 17. Responses to the peer and other institutional influences on subjective norms statement. Frequency measure of agreement to the three survey statements discretely aligned to the administrators', faculty peers' and students' influences on the subjective norms (ISN) factor originating from the modified DTPB.

Institutional supports. One hundred and seven of the 266 respondents agreed and an additional 64 slightly agreed that their IT department provides them the necessary support to integrate digital technologies for teaching and learning (DTTL) in their teaching practices followed by 21 who disagreed and 35 who slightly disagreed followed by a further 39 who indicated neutral on that statement. Overall, 216 respondents were in agreement with 158 of those agreeing and 58 slightly agreeing that their institution provides them with the training support necessary for their successful integration of (DTTL) in their practices. This was offset

by seven who disagreed, 18 who slightly disagreed and an additional 25 who indicated that they were neutral on that statement. Response to the statement "My College supports me with release time and/or professional development to integrate the use of DTTL into my teaching practice" resulted in an equally divided opinion as indicated in the third chart in Figure 18. Of the 266 respondents, 53 agreed and 56 slightly agreed which was counterbalanced by 67 respondents who disagreed, 41 who slightly disagreed with the statement resulting in the remaining 49 respondents indicating their neutrality on the statement. The results from the three statements concerning institutional supports available to respondents with regard to the integration of DTTL are presented in Figure 18.
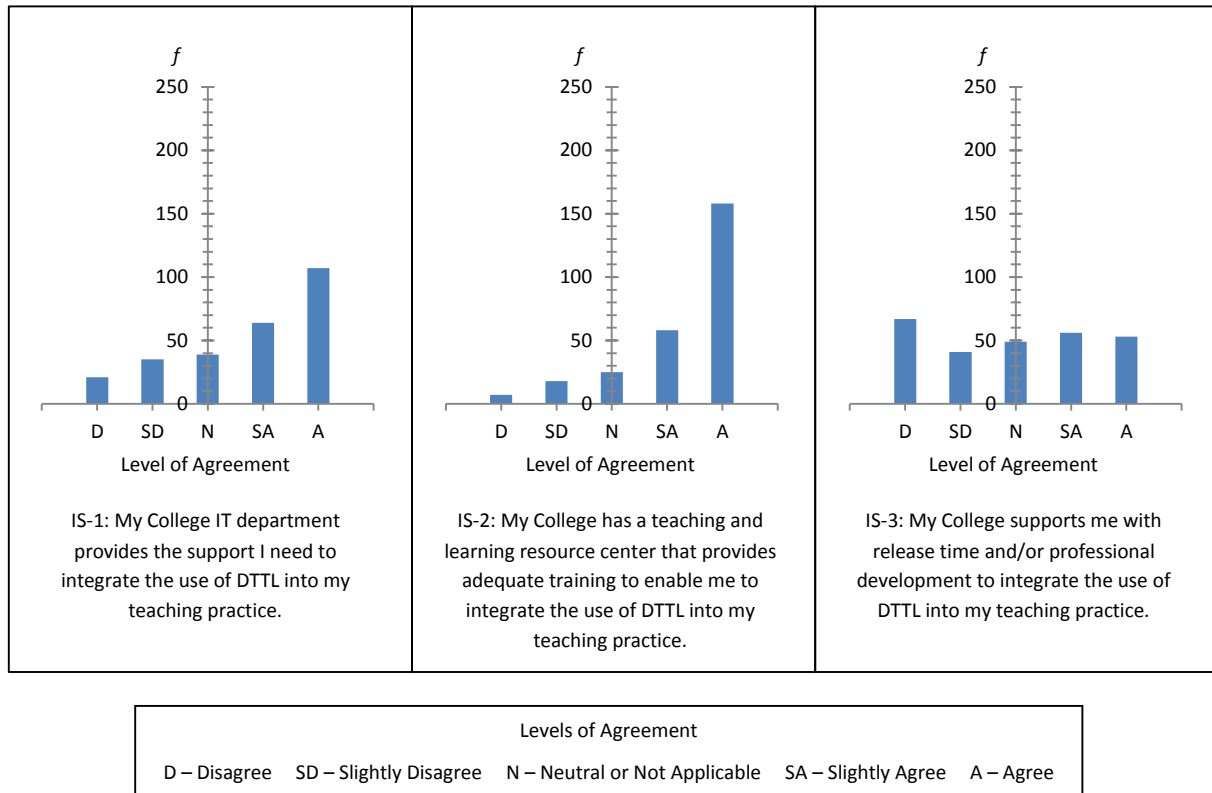
Figure 18. Responses to the institutional supports statement. Frequency measure of agreement to the three survey statements aligned to the institutional supports (IS) factor originating from the modified DTPB.

Perceived behavioural control. In total, 194 of the 266 respondents were in agreement with 101 agreeing and an additional 93 who slightly agreed with the statement "Integrating the use of DTTL into my teaching practice is completely within my control." Eighteen respondents disagreed with this statement followed by a further 35 who slightly disagreed; the remaining 19 respondents remained neutral on this statement regarding their perceived behavioural control in the implementation of DTTL. The results from the statement aligned to respondents' perceived behavioural control regarding the integration of DTTL in their practices are presented in Figure 19.

f

250

200

150

100

50

0

D   SD   N   SA   A

Level of Agreement

PBC-1: Integrating the use of DTTL into my teaching practice is completely within my control.

Levels of Agreement

D – Disagree   SD – Slightly Disagree   N – Neutral or Not Applicable   SA – Slightly Agree   A – Agree
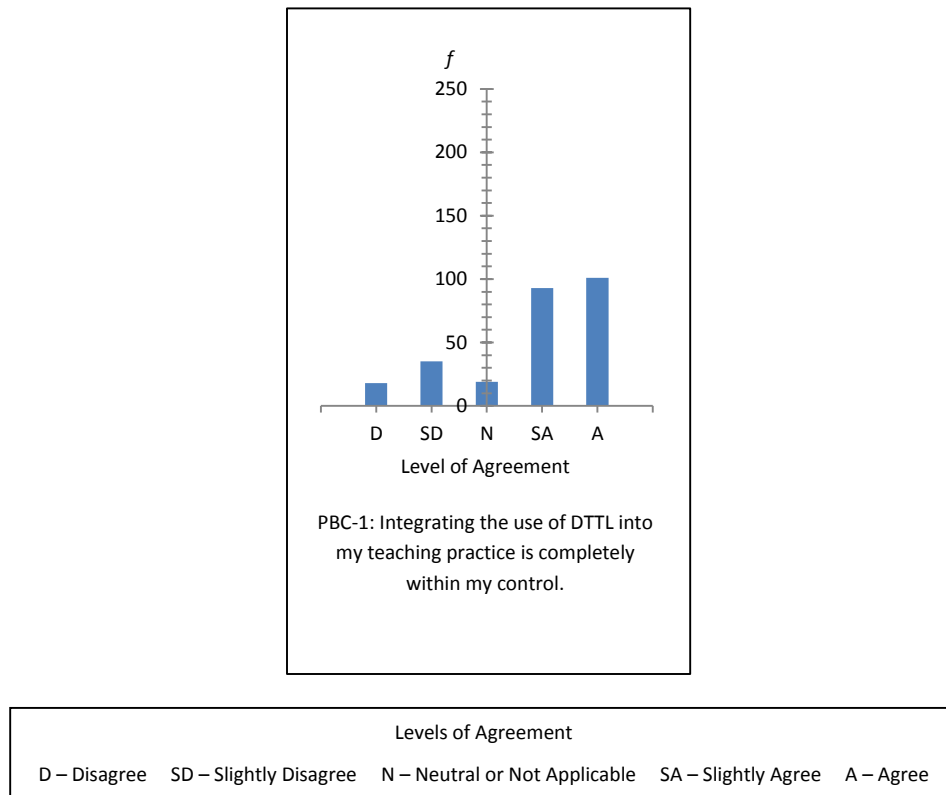
Figure 19. Responses to the perceived behavioural control statement. Frequency measure of agreement to the survey statement aligned to the perceived behavioural control (PBC) factor originating from the modified DTPB.

   Self-efficacy. Both self-efficacy statements SE-1 and SE-2 correspondingly received high levels of overall agreement (203 and 218) from the 266 participants in this section of the survey as well as minimal neutral opinions (14 and 16) as displayed in Figure 20. Specifically, 111 agreed and 92 slightly agreed with the statement "I have the knowledge required to integrate the use of DTTL into my teaching practice." Furthermore 133 respondents agreed with the statement "I feel comfortable using DTTL" with 85 who slightly agreed with that statement. The two statements garnered some disagreement with 15 and 13 respondents disagreeing and 34 and 19 slightly disagreeing with SE-1 and SE-2 respectively. The results from the two survey

statements aligned to respondents' sense of self-efficacy regarding the integration of DTTL in
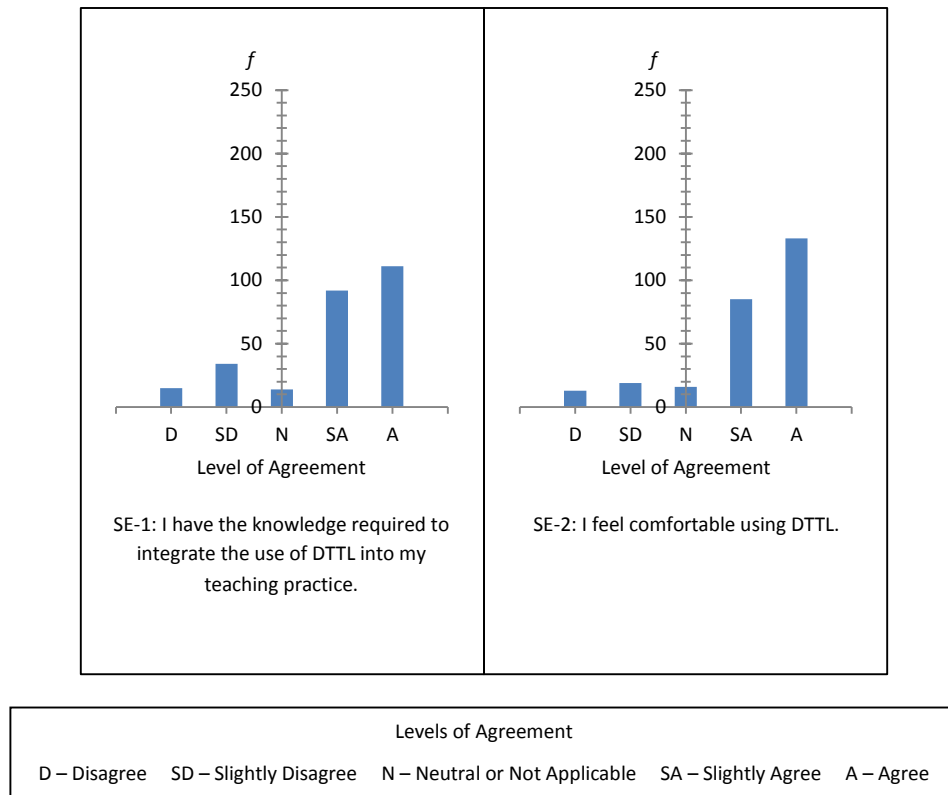
their practices are presented in Figure 20.

Levels of Agreement

D – Disagree   SD – Slightly Disagree   N – Neutral or Not Applicable   SA – Slightly Agree   A – Agree

Figure 20. Responses to self-efficacy statements. Frequency measure of agreement to the two

survey statements aligned to the self-efficacy (SE) factor originating from the modified DTPB.

Behavioural intention. The last three statements in this section of the survey, BI-1, BI-2,

and BI-3 were aimed at gaining insight into the respondents' intention to move to a greater level

of DTTL adoption than they are at currently. As depicted in Figure 21 the levels of agreement to

these three statements, perhaps not surprisingly, are very similar. When presented with the

statement "I plan to increase the use of digital technologies for teaching and learning (DTTL) in

my classroom", 212 of the 266 respondents agreed overall which was made up of 131 who

agreed and 81 who slightly agreed leaving eight who disagreed, 16 who slightly disagreed and 30

who were neutral on that statement. Correspondingly, when presented with the statement of

intention to further integrate the use of DTTL in their practices in the next semester, 204 agreed

overall with 120 in agreement and 84 in slight agreement followed by 10 respondents in

disagreement, 14 in slight disagreement and 38 who remained neutral on that statement. Again

in a similar pattern to the previous two statements, the third statement which declares an

intention to further integrate DTTL in their teaching practices in the next academic year, overall

agreement was indicated by 211 of the 266 respondents with 134 who agreed and 77 who

slightly agreed with eight who disagreed followed by 11 who slightly disagreed and 36 declaring

neutral on the statement. The results from the three statements aligned to respondents'

behavioural intention to integrate DTTL in their practices are presented in Figure 21.
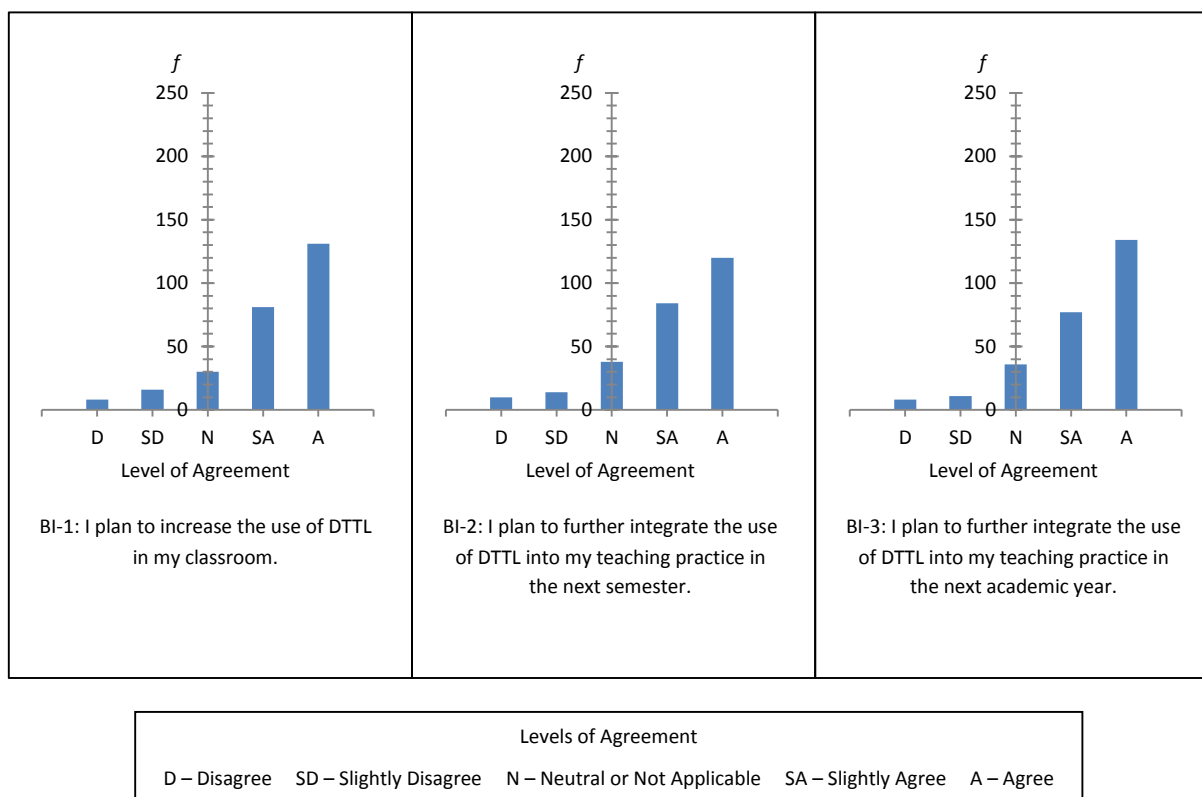
Figure 21. Responses to the behavioural intention statements. Frequency measure of agreement to the three survey statements aligned to the behavioural intention (BI) factor originating from the modified DTPB.

Open-ended questions. Two hundred and forty four survey participants responded to this section of the survey aimed at allowing participants to outline their individual beliefs and attitudes toward digital technologies for teaching and learning (DTTL) as well as to identify specific factors that have led, or might lead to their adoption of DTTL in their practices. Like the previous three sections of the online survey, responses to the questions in this section were completely anonymous. Once the answers to all open-ended questions were compiled, they were reviewed and analyzed based on the objective of each question. The approach employed was to code for specific themes emerging from each set of responses followed by identification of any

factor or factors from the modified decomposed theory of planned behaviour (DTPB), the

theoretical framework for this study, that could be attributed to each response and theme

identified. The purpose behind this method was to use the themes and subsequent factors that

emerged from the analysis of the open-ended questions to further indicate which factors should

be considered by administrators who aspire to improve the level of adoption of DTTL by college

faculty in Ontario.

Benefits to adoption. The first two questions in this section were aimed at building a

further understanding of the benefits that the respondents might see for themselves and for their

students through the adoption of DTTL. Both questions asked the respondents to "describe two

or more possible benefits to…of adopting digital technology into your teaching practice" with

the focus of the first question being on benefits to the respondent and the focus of the second

question regarding benefits to their students. While the approach was to use these questions to

mine information relative to the study's theoretical framework; upon initial examination of the

two sets of responses, it became evident that participants were responding to these questions with

reference to their pedagogical practice. Web and digital technologies both allow for a wealth of

experiences along with new opportunities for significant learning through the various forms of

interaction between students, teachers and content within a teaching and learning environment

(Anderson & Garrison, 1998). "There is a long history of study and recognition of the critical

role of interaction in supporting and even defining education" (Anderson, 2008, p. 56).

Anderson (2008) further proposes a pedagogical model for online learning based on the

interactions between the student, teacher and content. It is with those interactions and the

opportunities they afford, in mind, that the first level of analysis of the first two questions in this

section were coded according to Anderson and Garrison's (1998) six classifications of

interaction in teaching and learning as follows:

- Student-Student Interaction, (S-S I).

- Student-Content Interaction, (S-C I).

- Student-Teacher Interaction, (S-T I).

- Teacher-Content Interaction, (T-C I).

- Teacher-Teacher Interaction, (T-T I).

- Content-Content Interaction. (C-C I).

Once the responses were coded in relation to the six teaching and learning interactions, the responses were then each coded according to discrete factors identified in the modified DTPB.

The first question which asked respondents to describe any benefits to them in the adoption of DTTL was answered by 239 individuals. Data saturation was deemed to have been achieved at approximately 100 responses; an additional scanning of the remaining responses did not disclose any new information. Overall, approximately two thirds of the responses indicated that benefits to the faculty member reside in improvements or efficiencies in teacher-content interactions as the following response from one respondent illustrates.

> *Survey Participant Response:* I can find a variety of alternative explanations, demonstrations, etc. to communicate concepts to students with a variety of preferred learning modalities. Digital technology can provide creative and interesting ways to teach difficult topics. (T-C I)

Anderson (2008) describes teacher-content interactions as focused on the development, ongoing monitoring, and continuous updating of content and associated learning activities created for their students. When coded according to the modified decomposed theory of planned behaviour (DTPB) (see Figure 1), this type of response also indicates a high level of perceived usefulness of DTTL and was the predominant modified DTPB factor that emerged as a result of improved teacher-content interactions. The following response from one survey participant illustrates

perceived usefulness (PU) as a benefit resulting from improved teacher-content interactions.

> *Survey Participant Response:* Assignments submitted can be date/time stamped. Assignments uploaded electronically means [there is] no paper to carry around. Marks go right into the LMS Gradebook. Course material can be stored in one location. (T-C I), (PU)

"People tend to use or not use an application to the extent they believe it will help them perform their job better" (Davis, 1989, p. 320). It is this belief that respondents hold in the use of DTTL improving their job performance that stands as a measure of perceived usefulness (Ajjan & Hartshorne, 2008). Furthermore, Davis (1989) posits that "in addition to usefulness, usage is theorized to be influenced by perceived ease of use" (p. 320). The remaining few responses to this question indicated a benefit due to perceived ease of use (PEU) of DTTL through improved teacher-content interactions as illustrated by the following response from one survey participant.

> *Survey Participant Response:* Easier to store and refer to past documents/teachings/assignments/tests for easy retrieval (and some re-use) in future. Portable, can store on college server to retrieve anywhere. (T-C I), (PEU)

The remaining third of the responses to the first open-ended question resulted in close to an even split of benefits between improvements to student-teacher and student-content interactions. In each case, responses that were aligned to these two interaction improvements each aligned with the perceived usefulness factor in the modified DTPB. The following individual participant responses illustrate improvements to student-teacher and student-content interactions respectively as well as increased perceived usefulness (PU).

> *Survey Participant Response:* Yet another means of dialoguing and entertaining students to keep them motivated. Using an LMS saves time in having to send separate communication to individual students in need of assistance. (S-T I), (PU)

> *Survey Participant Response:* All resources are available to the student at all times, so access/absence is no longer an issue; if the teacher is away, work can be available to students reducing course time missed; it puts learning control in students' hands not faculty. [It's] up to the student to take advantage of the resources. (S-C I), (PU)

With digital and Web technologies allowing for a variety of communication channels, both

asynchronous and synchronous, the affordances for an increase in the level of student-teacher

interaction allows for the development of greater student involvement and commitment to the

learning environment (Anderson, 2008). Additionally, the use of DTTL allows for enhanced

support of some of the "more passive forms of student-content interaction" (Anderson, 2008, p.

58) such as study and content review.

The second question in this section asked respondents to describe any benefits to their

students through the adoption of DTTL. Also answered by 239 individuals and again it was

judged that data saturation was achieved at approximately 100 responses with no additional

information surfacing through a scan of the remaining data collected on this question.

Approximately four fifths of the responses to this question indicated that benefits to the student

reside in improvements in student-content interactions. Those improvements to student-content

interactions (S-C I) aligned in every case with the perceived usefulness (PU) factor from the

modified DTPB as illustrated by the following individual participant response.

> *Survey Participant Response:* Material can be available to review anytime. Students may
> find learning more interesting or inviting when it is delivered via tools they use every
> day. Many programs adapt to match individual student's skill/level and tailors review to
> match areas where the student requires practice. (S-C I), (PU)

The ability of DTTL to provide a flexible learning environment that responds to differing student

needs is further supported by the following individual response.

> *Survey Participant Response:* It allows the students to be more interactive with the
> material. It keeps things interesting and provides many different ways for the students to
> learn and practice what they are learning. (S-C I), (PU)

Anderson (2008) further states that "the development of interactive content that responds to

student behaviour and attributes…allows for customization of content in unprecedented ways to

support the individual needs of each unique learner" (p. 58). Roughly half of the remaining

responses to the second open-ended question revealed improvements to student-student

interactions (S-S I) all of which exclusively aligned again with perceived usefulness (PU) as

indicated by the following statements from individual respondents to the survey.

> *Survey Participant Response:* Increase in flexibility in collaboration with other students in the class via discussion boards etc. (S-S I), (PU)

> *Survey Participant Response:* The use of Wikis or discussion boards through D2L engages the students. (S-S I), (PU)

> *Survey Participant Response:* More [different] methods of communication [with] increased opportunities for collaboration. (S-S I), (PU)

Anderson (2008) posits that peer-to-peer interactions are valuable in their ability to foster

investigation and multiple viewpoints. Furthermore, Anderson (2008) states that student-student

interactions "can result in higher levels of cognitive, social and even teaching presence" (p. 57).

The final improved interaction theme present in the remaining responses to this question was the

student-teacher interaction (S-T I) all of which again aligned to the perceived usefulness (PU)

factor from the modified DTPB as shown by the following participant response.

> *Survey Participant Response:* Students can communicate with me or other students in discussion forums (they can ask questions of each other). (S-T I, S-S I), (PU)

The benefits afforded by an improvement in student-teacher interactions are realized through a

lower demand on the teacher to respond "immediately to every student question and comment"

(Anderson, 2008, p. 59). Anderson (2008) further suggests that by playing less of a leading role

in class discussions teachers actually support an environment of greater student dedication and

contributions to the learning environment. The benefits to students associated with

improvements or efficiencies in student-content, student-student and student-teacher interactions

all aligned to the perceived usefulness factor from the modified DTPB. The importance of

perceived usefulness (PU) as a factor that the institution may also benefit from is illustrated by

the following response from one survey participant.

> *Survey Participant Response:* Students enjoy DT [Digital Technology], it makes the class

far more engaging; many of them are very comfortable with DT and appreciate it the classroom application. It makes them feel like [the] College is up to speed with current technologies. Students enjoy the efficiency that utilizing DTs employs. (S-C I), (PU)

Ajjan & Hartshorne (2008) suggested in their study that perceived usefulness increased with an increase in the belief by faculty that any benefits realized by students in their practice ultimately "enhance their effectiveness" (p. 74) in their practice.

Institutional supports. In the third question, participants were asked to identify what it is that they might require from their Dean, or any other college administrative leader, as an incentive to adopt digital technology into their teaching practice. This question was designed to elicit specific details of the institutional supports or resources factor from the modified decomposed theory of planned behaviour (DTPB) that could encourage faculty to move toward the adoption of digital technologies for teaching and learning (DTTL). The first level of coding for this question was to confirm that responses were aligned to the institutional supports or resources factor from the modified DTPB or to identify any other factor or factors that emerged from the responses. A second pass of coding was undertaken to identify the specific details of those factors with the intention of creating a list of tangible actions or incentives that college administrators could provide, or employ in the effort to increase usage of DTTL by their faculty.

One hundred and ninety eight participants answered this question; data saturation was deemed to have been achieved at roughly 100 responses with no new information being revealed through a subsequent scanning of the remaining responses. The majority of responses indicated various resources or institutional supports as key factors that may influence faculty to adopt DTTL in their practices. Resources and other institutional supports, or facilitating conditions have been shown to be determinants of perceived behavioural control leading to intention to use digital technologies (Lau, 2011, & Taylor & Todd, 1995). With regard to digital technology usage, those resources and supports include the following tangible items and incentives: (a) time;

(b) training; (c) the availability of, and access to, technology; and (d) the infrastructure and

personnel to support the technology (Lau, 2011; Taylor & Todd, 1995; & Venkatesh, Morris, G.

B. Davis, & Davis, 2003). Close to half of the responses aligned to the resources and other

institutional supports (IS) factor from the modified DTPB indicated that the availability of

training in the use of technology as well as the possibilities for use of the different tools available

both as critical to their successful adoption of DTTL in their practice as the following two

individual responses indicate.

> *Survey Participant Response:* Effective training modules for ALL faculty, old and new, full-time and contract, needs to be brought to the department level , perhaps in a work-shop format to ensure we are ALL equally comfortable navigating the technology. Interesting NEW concepts for digital delivery could be shared [and] promoted to spark an interest in doing things in new ways. (IS), (Training)

> *Survey Participant Response:* PD opportunities to learn about new and emerging digital technologies and how they can be used in teaching and learning [as well as] providing updates on research and measures related to the advantages and benefits of digital technologies in the classroom. (IS), (Training)

The number of responses indicating training as a necessary institutional support was

matched only by time as a necessary support. Again, slightly less than half of the responses

aligned to resources and other institutional supports indicated that time was crucial to their

development of the skills necessary to implement the tools provided, to learn about or

experiment with those tools that might best fit their practice, to manage the new demands of

using DTTL, or to develop materials using a new DTTL. The following responses from three

individual survey participants illustrate the need for increased resources or other institutional

supports (IS) in the form of additional time.

> *Survey Participant Response:* Release time from teaching to learn, practice, integrate/implement and evaluate the tools of digital technology to fit my class content. (IS), (Time)

> *Survey Participant Response:* Providing release time for planning and preparing courses for online/hybrid format or to learn to use and incorporate technologies into courses and

teaching practice. Provide reasonable deadlines for the development of courses that are to use new technologies and/or new digital formats. Acknowledge and support the time and effort required to manage digital technologies e.g. increased email [and other] communications [due to] the 24/7 expectations of students. (IS), (Time)

Survey Participant Response: Give proper time to learn and implement both before it is used and during adoption and implementation, [do] not push 'one size fits all' approaches to DTTL. Sometimes, SMEs are the best judge of what can support their specific students' learning. (IS), (Time)

These responses indicate the need for release time as a distinct institutional support and as such would require financial support for that release time. There were some responses that explicitly aligned time with the need for financial compensation for additional workload time to investigate various tools, learn the skills necessary to employ the tools and to develop course materials using those tools as illustrated through the following two individual responses.

Survey Participant Response: Recognize that it takes time to learn and integrate and reflect that on the SWF (Standard Workload Formula). Support faculty attending instructional IT conferences. (IS), (Time, Financial Support)

Survey Participant Response: Perhaps add time to SWF to take courses during the academic year or allow faculty to use training as PD during spring/summer period. Pay for courses that must be taken outside of the college due to [overtaxed] resources within the college…unable to accommodate my schedule to allow me to take a course in online creation. I have classes scheduled at the time the next course is being offered. (IS), (Time, Financial Support)

Finley and Hartman (2004) found that funded release time to experiment with technology to be essential when requiring faculty to consider significant changes to their teaching practice. The need to support faculty financially in their efforts to incorporate new DTTL in their practice is further supported by Owen and Demb (2004). They found faculty were frustrated in part due to "the fact that their efforts are not captured in old workload models whose structure does not accommodate this new work, thus failing to provide the base for appropriate recognition and reward" (p. 663).

The last distinct institutional support (IS) of note that emerged from the responses to this

question, albeit to a much less significant degree, was the need for ongoing attention to the

reliability of current systems and IT support as outlined in the following three respondents'

comments.

> *Survey Participant Response:* Ensure that all the equipment is running smoothly [and]
> ensure that all upgrades run smoothly. (IS), (System Reliability)

> *Survey Participant Response:* I feel that the direct incentives are mostly in place. I think
> that making sure disincentives are managed is also important. For example, ensuring the
> LMS (or whatever other digital technology tool is being targeted) is reliable. (IS),
> (System Reliability)

> *Survey Participant Response:* The LMS needs to be much much more reliable. I have had
> no end of trouble because the students and I expected the system to work but it did not.
> Last year, for example, students could not sign on in a timely manner. The system was
> unavailable at midterm and at the end of the semester when I was really counting on it.
> (IS), (System Reliability, Support Reliability)

Owen and Demb (2004) found that some of the chief development and deployment concerns for

faculty frequently related to technical support. In their study, Roca et al. (2006) posit that

"system quality and service quality were found to be direct antecedents of satisfaction" (p. 694).

Furthermore, Roca et al. (2006) maintain that administrators should ensure the development and

deployment of systems that provide a reliable user experience along with prompt and dependable

service support.

Roughly half of the lesser fraction of responses to the third open-ended question that

were not aligned to resources or other institutional supports indicated compatibility as a factor to

be considered by deans and other college administrators as having some influence over faculty

use of digital technologies for teaching and learning (DTTL). Rogers (2003) describes

compatibility as the level to which the use of a specific technology is consistent with values, past

practices and needs of potential users. The modified DTPB implemented in this study and as

illustrated in Figure 1 defines compatibility as the level to which faculty see DTTL supporting

teaching and learning in a way that is both positive and in line with their current practice as

supported by their professional beliefs and values. All of the responses to this question that

aligned with the compatibility (C) factor indicated concern for the quality of the teaching and

learning experience through the implementation of DTTL as the following individual responses

effectively demonstrate.

> *Survey Participant Response:* One of the most important things that college
> administration can do is to make available specific research studies that indicate the
> value, advantages, and disadvantages of various digital media "in the classroom." The
> college needs to do this in order that academic decisions are made because the research
> supports them. It is sometimes the case that certain practices are encouraged in order to
> cut costs rather than to enhance student learning. (C), (Teaching and Learning)

> *Survey Participant Response:* Show me concrete ways that it will enhance my teaching.
> Currently, I feel that there is a push to integrate technology just for its own sake. But
> there are certain subjects or lessons that work better in a traditional classroom setting.
> The biggest incentive I have right now is that I have been led to believe the
> administration is more interested in hybrid and online courses, therefore, I pitch these
> rather than traditional classes when I want to design a new course. (C), (Teaching and
> Learning)

Administrators should carefully consider the educational beliefs of faculty with regard to their

own teaching practices as well as their views regarding any engaging or disengaging experiences

that may develop due to the use of DTTL in their practice (Levin & Wadmany, 2008).

To an even lesser degree than compatibility, some responses to the third open-ended

question were found to be aligned to the institutional norms factor found in the modified DTPB.

The key concern to the authors of these responses is that their institution's leaders set standards

to be enforced regarding the use of DTTL at their colleges. The following two individual

responses aligned to institutional norms (IN) indicated demonstrate the desire to see usage

normalized to some degree across the institution.

> *Survey Participant Response:* Ensure it is part of the strategic plan for the organization
> and the department. (IN), (Standard of Use)

> *Survey Participant Response:* Incorporate the practice of using digital technology in all
> courses taught at the college level. (IN), (Standard of Use)

In the modified decomposed theory of planned behaviour (DTPB) institutional norms are shown to be a direct antecedent of compatibility and are a reflection of the how a college positions itself with regard to the implementation of DTTL. The position taken by college leadership determines the expectations of behaviour with regard to the usage of DTTL within that college as supported by Yew Wong & Boon-itt, (2008).

Of the remaining responses, a few indicated a need for more perceived behavioural control with regard to opportunity and the availability of the appropriate resources to meet their needs and not hamper their adoption of DTTL in their practice as supported by Ajzen, (1991) and Taylor & Todd (1995). The following responses illustrate three respondents' concerns for their lack of perceived behavioural control (PBC).

> *Survey Participant Response:* Allow faculty, rather than the IT department, to lead academic technology research, acquisition, implementation, and evaluation. (PBC)

> *Survey Participant Response:* Allow for more creativity in how the marks are allocated using digital technology. (PBC)

> *Survey Participant Response:* Provide the freedom to investigate the appropriateness of online or hybrid for my individual courses, some may not be suitable. (PBC)

Lau (2011) and Taylor & Todd (1995) both support perceived behavioural control as a significant determining factor in digital technology adoption.

The final modified DTPB factor to emerge from responses to the third open-ended question was the peer and institutional influences on subjective norms. As Ajzen & Fishbein (1980) and Taylor & Todd (1995) posit, if faculty believe that students, faculty peers and their superiors encourage the adoption of DTTL, that encouragement should increase intention by faculty to do so. The handful of responses to this question that were aligned to participants' subjective norms (ISN) indicated that they were looking to the influences of their administrators, peers and students such as the following individual responses demonstrate.

Survey Participant Response: Students become frustrated when one teacher is using all kinds of digital technology and another teacher hands out paper after paper but doesn't use the college LMS. (ISN), (Students)

Survey Participant Response: Provide effective role modelling. (ISN), (Peers)

Survey Participant Response: Encourage more use of technology other than antiquated methods. (ISN), (Administrators)

Survey Participant Response: Threaten to fire me. (ISN), (Administrators)

Factors that motivate. The final open-ended question asked respondents to describe the key factor that influences or could influence them to decide to adopt digital technologies for teaching and learning (DTTL) in their teaching practice. This question was designed to elicit specific details of the respondents' most important personal, or internal, factors or the key external factors that could aid in their uptake of DTTL in their practices. As was done with the third open-ended question, the responses to this question were initially coded against those internal and external factors defined by the modified DTPB. Subsequently the responses were coded to identify the specific details of those factors with the intention of adding to the list of discrete institutional supports, influences on subjective norms or institutional norms affecting compatibility. It was furthermore held that the list of tangible actions or incentives would grow based on the responses to this question to include those internal, or personal, factors from the modified DTPB such as compatibility, perceived ease of use, perceived usefulness, perceived behavioural control, or self-efficacy.

Two hundred and thirty two survey participants answered this question with data saturation judged to have been reached at approximately 100 responses; an additional scanning of the remaining data did not reveal any new information. Roughly one third of respondents to this question identified various resources or institutional supports as possible influences on their adoption of DTTL. An almost equal number of respondents identified perceived usefulness as a

key influencer in their decision to adopt DTTL in their practices. With resources and other

institutional supports as significant determinants of perceived behavioural control leading to a

decision to adopt digital technologies (Lau, 2011, & Taylor & Todd, 1995), the responses to this

question again supported that assertion with many indicating that reliable and timely IT support,

time and training were key in their decision to adopt DTTL. Respondents to this question were

given the opportunity to identify any factor, internal or external, that they considered crucial in

their adoption, or decision to adopt DTTL. Following the results of the third open-ended

question where resources and institutional supports were identified as critical in the adoption and

use of DTTL, the individual responses to this final open-ended question further illustrate that

administrators should pay close attention to the needs of faculty with regard to time, training, and

reliable technology along with timely technical support. The following individual survey

participant responses demonstrate the need for resources and other institutional supports (IS) in

support of DTTL adoption.

> *Survey Participant Response:* Time! Time to learn about the technologies, time to think about how it can be incorporated into my practice, time to learn how to use the technology, time to adapt course materials or processes to make use of the technology, time to evaluate whether the technology has had a positive impact on student learning. (IS), (Time)

> *Survey Participant Response:* That the IT works properly and that we get instant and knowledgeable help when we need it. (IS) (System Reliability, Support Reliability)

> *Survey Participant Response:* I have already decided to adopt digital technology but once I have IT support to maintain and improve I will continue to increase. Adequate training and support is essential to do it well and with minimal frustration. (IS), (Support Reliability, Training)

> *Survey Participant Response:* Proper training; all training I have received on these technologies have been lectured or point-and-click demonstrations. I want someone to engage me in the technology, using best practices, to let me see and understand its usefulness and advantages. (IS), (Training)

Time to evaluate various tools, time to learn the skills necessary, and time to develop course

materials along with flexible and relevant training and appropriate technical support are all

necessary for faculty to feel confident in their decision to adopt, and to continue using DTTL

(Beggs, 2000; Levin & Wadmany, 2008).

The responses to this question indicated perceived usefulness to be almost equally as

important as resources or other institutional supports with regard to the decision by faculty to

adopt DTTL in their practice. Defined as "the degree to which a person believes that using a

particular system would enhance his or her job performance" (Davis, 1989, p. 320), perceived

usefulness has a significant effect on attitudes toward adoption and usage of new technologies

(Ajjan & Hartshorne, 2008; Lau, 2011; Taylor & Todd, 1995) and is correspondingly situated in

the modified DTPB as a direct determinant of attitudes toward behavioural intention to adopt.

Responses that aligned to the perceived usefulness (PU) factor largely indicated enhancements in

the learning environment that result in an improved learning experience for students are key in

faculty decisions regarding adoption of DTTL in their practice. This point is illustrated by the

following comments from individual survey participants.

> *Survey Participant Response:* Believing that it's appropriate for my students/learning
> environment and seeing evidence that it is in fact effective for learning versus the
> "flavour of the day/month." (PU), (Teaching and Learning)

> *Survey Participant Response:* Can I see tangible results? Is the students' feedback
> positive; do they appear to be [more] engaged [and] happier; has the typical marks curve
> shifted; is the technology enhancing delivery or simply changing it? (PU), (Teaching and
> Learning)

> *Survey Participant Response:* The most important factor would be whether or not the
> specific technology will increase the learning of my students. (PU), (Teaching and
> Learning)

Jacobson (1998) found changes to a learning environment and teaching practice that improve

students' learning and satisfaction to be a strong motivator for the adoption of DTTL as further

supported by Ajjan and Hartshorne, 2008; Huang and Jabor, 2011; and Roca et al., 2006.

The following individual response indicates a lack of perceived usefulness with regard to improving the student learning experience yet there is acknowledgement that DTTL tools have a potential role in improving one's own teaching practice.

> *Survey Participant Response:* I believe that face to face teaching and discussion is still extremely important and should not be completely replaced. Students need to develop "people skills" while they learn. Digital technology should only be used to enhance teaching. (PU), (Teaching and Learning)

"There is clearly a gap between the convinced and unconvinced with regard to the value that technology can add to the classroom" (Jacobson, 1995, p. 88). Conversely, Jacobson (1998) subsequently found that some faculty are drawn to using DTTL in their practices due to improvements and added efficiencies in some tasks and operations over more traditional methods. The following responses from two survey participants further support this view.

> *Survey Participant Response:* Ease of communication to students, recording keeping of assignments. (PU), (Task Efficiency)

> *Survey Participant Response:* The payoff, number of hours saved down the road minus number of upfront hours required to get everything up and running. (PU), (Task Improvement)

Following improvements to the student learning experience, Beggs (2000) similarly found that advantages to the teacher over traditional methods ranked high on the list of factors that may influence faculty to adopt DTTL in their practices.

Of the remaining third of the responses to the fourth open-ended question, slightly more than half included comments that described perceived ease of use as a factor that influences a decision to adopt digital technologies for teaching and learning (DTTL). The modified decomposed theory of planned behaviour (DTPB) places perceived ease of use as an antecedent of attitudes toward behaviour and of perceived usefulness which also influences behaviour. Perceived ease of use is a key determining factor in the decision to adopt DTTL by directly influencing attitudes and perceived usefulness as supported by Ajjan and Hartshorne, 2008;

Divett and Henderson, 2003; Huang and Jabor, 2011; and Venkatesh and Davis, 2000. The

consistent themes that emerged as critical to the ease of use of DTTL were ease of set-up and

ease of ongoing use for both the teacher and the student. The following responses from

individual survey participants illustrate the perceived ease of use (PEU) factor through those

themes.

>   *Survey Participant Response:* Ease of use. Teaching is not my full time job. I want to be
>   a great teacher and remain current, but it is difficult to find and justify the time to learn
>   how to effectively use digital technology. (PEU), (Easy to Set-Up, Teacher Use)

>   *Survey Participant Response:* Ease of setup and managing for me and ease of use for
>   students - if it is too hard to set up, manage and use, then no one will use it. (PEU), (Easy
>   to Set-Up, Teacher Use, Student Use)

>   *Survey Participant Response:* Easier to manage, can update assignments and course
>   outlines easier rather than printing them out, than making changes and re-printing them
>   out. (PEU), (Teacher Use)

Davis (1989) states "if potential users believe that a given application is useful, they may, at the

same time, believe that the system is too hard to use and the performance benefits of usage are

outweighed by the effort of using the application" (p. 320).

The final factor that emerged in the responses to this question was self-efficacy defined

by Bandura (1997) as the "beliefs in one's capabilities to organize and execute the courses of

action required to produce given attainments" (p. 3). The modified DTPB implemented in this

study and illustrated in Figure 1 places self-efficacy as a direct determinant of behavioural

intention to adopt as well an indirect determinant of intention through perceived behavioural

control. Those responses that were linked to self-efficacy (SE) were all focused on the

respondents' comfort level with the adoption and use of DTTL as illustrated by the following

two survey participants' responses.

>   *Survey Participant Response:* Comfort level with digital technologies; I am not the most
>   technologically savvy person and I feel swamped for time right now. (SE)

Survey Participant Response: Working with [learning technologists] on a weekly basis to keep me on track, maybe in the form of attending the posted workshops and then following up with 15-minute meetings or phone calls to make me feel that I know what I am doing. Increasing my belief that I can not only do it, but instruct my students "how to." (SE)

Taylor and Todd (1995) assert that "self-efficacy places a focus on training as an important mechanism to influence system acceptance" (p. 170). Ajjan and Hartshorne (2008) and Roca et al. (2006) further assert that a greater sense of self-efficacy may lead faculty to feel more confident in moving forward with a decision to adopt DTTL in their practice.

Interview Responses

The intention of this study is to develop an understanding of the factors at play in the adoption of digital technologies for teaching and learning (DTTL) leading to the development of a list of those most effective factors that may influence college teachers to adopt or not to adopt, digital technologies into their practice. The semi-structured interviews provided an opportunity for 14 individual participants to fully express their personal comfort level with digital technologies and what factors led to their past, or may lead to their impending, DTTL adoption decisions. Each interview was conducted with the understanding, by the interviewee, that all comments made and all data collected would be held in the strictest confidence with no identifying names or other attributes connecting them to the final results reported here. Therefore, all interview data was encoded with a random alphanumeric identifier in place of each interviewee's name then transcribed and prepared for coding by the interviewer in an effort to maintain maximum confidentiality of the participants' responses. Through this repetitive interaction with the information gathered from the interview process the interviewer developed a very clear picture of the data and the themes as they emerged throughout the data collection, transcription and preparation processes.

Once each interview transcription was prepared for coding they were reviewed and

analyzed based on the objective of each question and then divided into three groups based on

responses to questions one, two, three, four and seven in each case. Those five questions

provided information on each interviewee regarding their years' of experience teaching, subjects

taught, the DTTL that they currently use in their practice and their self-measured assessment of

their level of DTTL use in relation to their peers. The three groups that emerged at this point of

the analysis were:

- innovators and champions of DTTL usage,

- regular users of DTTL who are open to further investigation of DTTL, and

- concerned or reluctant users and resistors or laggards (Rogers, 2003) to DTTL.

The complete profile of the interview participant groups is presented in Table 3.

Table 3

Face-to-Face Interview Participant Group Profiles

	Group Members Experience				
Participant Group	Number in Group	Number with Part-time Experience	Number with Full-time Experience	Mean Years' Experience	Program Areas Represented
Innovators and Champions of DTTL Usage	5	4	3	14	Business and Management Studies, General Arts and Sciences, Health Sciences, Hospitality and Tourism, Human Services and Justice Studies
Regular DTTL Users	6	2	5	11	Applied Arts, Business and Management Studies, Information and Communications Technology, Justice Studies, Media and Communications Arts, Science and Technology, Skilled Trades and Apprenticeship
Concerned DTTL Users and Resistors to DTTL	3	1	3	17	Business and Management Studies, General Arts and Sciences, Media and Communications Arts, Science and Technology

Note. Mean Years' Experience included part-time and full-time experience. Program Areas Represented includes current program area and any past program areas taught in.

Two sets of interview data from each of the first two groups were selected along with one set of laggard data for further analysis and coding. Coding was carried out according to the specific themes that emerged from each set of responses followed by the identification of any factor or factors from the modified decomposed theory of planned behaviour (DTPB) that could be attributed to each response and theme identified. Once coding was completed on the initial five sets of interview data the remaining nine sets of data were examined and coded to seek out any differing themes or factors that appeared inconsistent with the initial five sets of data. Although the investigation of the remaining nine sets of interview data did not reveal any new

information that hadn't been revealed through the first five sets, overall this approach resulted in additional evidence of the validity of a number of factors to be considered by administrators looking to increase the level of adoption of DTTL by college faculty in Ontario.

Digital technology in teaching and learning. Interview participants were asked to "describe how [they] see digital technology 'fitting in' to teaching and learning or in support of teaching and learning." This question was aimed at discovering each participant's beliefs regarding the use of digital technologies for teaching and learning (DTTL) in their practice and as such, could be considered when looking at the compatibility factor with regard to institutional norms. The modified DTPB employed in this study positions compatibility as the degree to which the institutional needs to realize an increase in the use of DTTL is perceived as being in line with the beliefs, past practices and current needs of college faculty. Rogers (2003) posits that "compatibility of an innovation with a preceding idea can either speed up or retard its rate of adoption" (p. 243). With this in mind, it can be reasoned that within an existing successful teaching practice that each faculty member holds their own standard of measure of potential value of any new DTTL (Ajjan & Hartshorne, 2008; Rogers, 2003). The responses to this question indicated varying levels of compatibility (C) beliefs with some positive comments regarding the use of DTTL such as the following two comments.

> *DT62C6 Response:* I think at this point [digital technology and teaching and learning] are so integrated that it's almost counterproductive if you are not taking steps to kind of integrate them into your teaching environment. (C)

> *DT75J9 Response:* I like to think that it's something that can engage them differently than face to face interaction in the classroom and that it gives them opportunities to explore well beyond my knowledge base. (C)

There were an equal number of comments where the participants indicated some reservations or limitations regarding the use of DTTL as the next three comments illustrate.

> *DT96A6 Response:* The more we push [students] to digital technologies, maybe the less

development they'll have in the ability to communicate, articulate, read facial expressions, body language, little nuances, that we took for granted growing up as that was the way to communicate. (C)

DT62C6 Response: And just because you say "oh I'm using YouTube", doesn't mean that you're actually helping your students…looking at the pedagogy behind the implementation of the tool, I think is more important than what tools you're using. (C)

DT24V8 Response: The driver is the learning theory and the process of learning, the support structure and the enabler is the technology. (C)

As illustrated in the modified DTPB in Figure 1, compatibility resides as a determinant in conjunction with perceived ease of use and perceived usefulness in the formation of attitudes toward the behavioural intention to adopt DTTL. There were positive comments regarding the perceived usefulness (PU) of DTTL to enhance the student learning experience through enhanced communication along with course material management and content delivery such as the following individual responses describe.

DT60N9 Response: So, from my perspective I've found [the LMS] to be an invaluable tool because it just helps with the communication with the students and to assist in classroom management. (PU)

DT42E9 Response: I use it as a support, because I found, if my class is 50 minutes of instruction I make all my content that I provide during the class available on [the LMS], I put links to videos that would reiterate whatever I've demonstrated in the class, and I put links to the Kahn Academy which is a heavy math leaning site, I put links to where the students can actually test their own understanding and get immediate feedback without me creating online quizzes. They can use this and go to it themselves. (PU)

DT58I2 Response: For a long time I saw it as a means to facilitate some of the traditional things that I would do just in a way that was easier for me like replacing hand-outs, and replacing overhead slides and ah, you know streamlining communication and that stuff. (PU)

These types of comments were echoed throughout the data indicating a strong measures of perceived usefulness of DTTL as a determinant of attitude and ultimately behavioural intention as supported by Ajjan & Hartshorne (2008); Lau (2011); and Taylor & Todd (1995). Taylor & Todd (1995) advance that "a significant effect of perceived usefulness on IT usage indicates that

usefulness indirectly influences usage" (p. 159).

DTTL adding value. The next interview question was purposely designed to determine

the impact of perceived usefulness on the decision to adopt by posing the question "can you

describe a digital technology that you have adopted in or adapted to your teaching practice that

you feel has added value to you or your students?" In coding this question, a first pass was made

to identify specific tools employed by the interviewees followed by a second pass to test those

tools against perceived usefulness based on the interviewee confirming that the tool did bring

value to their teaching and learning practice. There were no tools identified that were then

dismissed as not bringing value; in fact all tools referenced in answer to this question indicated

some level of added value and correspondingly perceived usefulness to the interviewee, the

student or both. Any added value or improvement in performance or existing processes, within

an individual faculty member's practice, results in an increase in the level of perceived

usefulness of the digital technologies for teaching and learning (DTTL) that enabled the

additional value or improvement (Davis et al., 1989). The following individual interviewee

responses to this question describe some of the tools that respondents indicated as bringing

value, thus perceived usefulness (PU) and the beneficiary of that added value, the teacher or the

student.

> *DT60N9 Response:* So to be honest, for me, it's using tools that are part of the LMS that
> the college uses, so the one tool that I've used a lot this past semester is the Dropbox tool
> as a means for students to submit assignments and returning feedback via that tool. And
> I've used, the news announcement tool as part of our LMS system, whenever there's a
> change or something comes up to alert students right away, I found that the best tool to
> get word out there quickly. (PU), (Student, Teacher)

> *DT75J9 Response:* Definitely the little instructional videos that accompany the
> assignments, I tend to get feedback on that from students who struggle, so it's the ones
> who come to class and listen and are really trying hard but their skill level is very low,
> really benefit from being able review that assignment in detail. I have the assignment up
> visually, I'm recording that and I'm talking about it at the same time, and I'm showing
> them here's one from last year that wasn't so great and here's why it wasn't so great, and

here's another one that was pretty good and here's why it was so good. I get a lot of verbal feedback, like "that really helped", so I think that's value added. (PU), (Student)

DT62C6 Response: I think if I had to pick one, I'll pick Skype because I use Skype a lot and I find it to be one of the best in terms of interacting with students. (PU), (Student, Teacher)

DT75Q3 Response: So I just created a Padlet that had a side section, that says face to face and one that says online and they can all go online while in class synchronously and add their ideas to it and then we can bring it up and take it up. So it's kind of a neat way of being able to do brainstorming and then it's live so we can go back to it. (PU), (Student)

This question also elicited a few responses that indicated the use of some DTTL that contributed added value for students in the learning environment but also indicated some concern or reluctance to go further with the DTTL due to a lower perceived usefulness with regard to a lack of added value for the faculty member, as indicated in this response from one interviewee.

DT40T3 Response: Well I think what I use has added value for my students because they always know where they stand with the marks, they always know where they are, that instant feedback is good, and there's really no excuse for coming to me at the end of the year and saying oh gee, I didn't realise I was failing. I don't doubt that other aspects of DC connect add value in other courses, other areas, for sure, I'm sure they do, and if I thought they would add value for me, I would use them. I don't want [students] emailing their assignment, I want it on a piece of paper, I have it on my desk, with a red pen, I go through it, or I have it at home with a red pen and I go through it, I don't want to be looking at a computer screen all night marking stuff, I'll do it on a piece of paper or not do it. (PU), (Student)

This response highlights the nature of perceived usefulness, also referred to by Rogers (2003) as relative advantage, as a measure of how the use of DTTL is perceived to be an improvement over the processes that preceded its use.

Pressures to adopt DTTL. The next question in the interview asked interviewees if they had felt any pressure or pressures to adopt DTTL in their practice and, if so, to identify the nature of the pressure. The aim of this question, in part, was to identify any peer or institutional influences on subjective norms that might be at play in the interviewees' decision making process regarding an adoption of DTTL. Peer or institutional influences on subjective norms

encompass all social pressures perceived by faculty toward behaviour and exerted by people who are important to the faculty member including their faculty peers, their students, their deans or other administrators. Those influences shape each individual faculty member's belief, or subjective norm, that they should undertake a specific behaviour based on those influences (Ajzen & Fishbein, 1980; Taylor & Todd, 1995). The other factor that this question brought into light was institutional norms or expectations of behaviour that would be deemed in line with institutional standards or policy (Dacin, 1997; Yew Wong & Boon-itt, 2008).

When reviewing the responses to this question the first pass of coding was to determine if the interviewees had felt any pressure to adopt or not. This was followed by a second pass to identify the type of pressure perceived by each interviewee, if any. The next level of coding was undertaken to confirm alignment of the responses to peer or institutional influences on subjective norms or institutional norms, both factors that have been defined in the modified DTPB. A final review was undertaken to ascertain the specific DTTL that the interviewees had indicated feeling pressure to adopt in their practice. The two specific DTTL that emerged as tools that interviewees felt pressures to adopt were the institutional Learning Management System (LMS) and online and hybrid course design for teaching and learning. Twelve of the fourteen interviewees reported feeling pressures to adopt DTTL which all fell into one of the following categories: (a) expectations, (b) recommendations, (c) reminders, or (d) directives. The sources of the pressures identified were: (a) deans or other administrators, (b) college mandated use policy, (c) faculty peers, (d) students, and (e) self-induced.

Approximately half of the interviewees reported pressures to adopt specific components of their college's LMS, or hybrid and online learning course development where those pressures came in the form of peer or institutional influences on their subjective norm (ISN) as illustrated

by the following individual responses from three interviewees.

> *DT51O6 Response:* So you know I feel, I guess it is personal pressure but I also think we all put a little bit of pressure on each other or we get excited about what somebody else has done and we want to do that too. (ISN), (Self-Induced, Peers)

> *DT31M5 Response:* So I believe that regarding a lot of the new [General Education] courses that are being developed, we're being asked to develop online. And initially I was hesitant and a little apprehensive about that type of delivery but then having developed one, I've thoroughly enjoyed it actually. So I'm not so sure I was pressured, my dean certainly said that we could look at whatever delivery I wanted but did kind of steer me more towards that way. (ISN), (Dean)

> *DT24V8 Response:* Yeah, absolutely, the fact that Blackboard existed at my institution when I came to it and I'd never encountered it before, and I had students that were familiar with the fact that it existed; the whole reason why I started exploring technology was because my students wanted me to. (ISN), (Students)

Both Taylor & Todd (1995) and Lau (2011) found administrative, and peer influences, or social pressures, to have a positive effect on subjective norms leading to a behavioural intention to adopt a technology. Rogers (2003) defines an individual's social system as "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (p. 23). With the common goal being student success in learning, the interrelated units in each interviewee's social system would include their students, their faculty peers and their superiors. Rogers (2003) further holds that the social system's norms or behavior patterns can influence an individual's decision to adopt or not to adopt.

Equal in occurrence to those responses indicating pressures to adopt originating from peer and institutional influences on subjective norms, many responses to this question revealed pressures to adopt specific tools within college's LMS, or hybrid and online learning course development where those pressures originated from the institutional norms at the interviewees' individual colleges. The following comments from three different individual interview participants illustrate pressures to adopt DTTL based on institutional norms (IN).

> *DT75Q3 Response:* Because the institution uses the LMS, and we're using the grade

book and everything, I do use it and adopt it and have to model its use. But if it was completely up to me, and I was able to use different tools, I might not necessarily use LMS as my main home base. (IN)

DT42E9 Response: I get the sense that the only really mandated one is that we should be using the LMS…I think that it's a well-placed initiative, and for our students sake, and it would help if we all embraced that because we would all be consistent. (IN)

DT96A6 Response: I think there's pressure coming from the higher ups in the system coming down to the Presidents, the VPAs to the Deans to develop online and hybrid courses but I feel that it will not benefit the student in the long run. So I would feel that if it was asked of me to deliver certain courses that way then I would feel pressure to say no. (IN)

Pressures such as those described in these responses may actually impede the rate of adoption of

DTTL unless administrators fully engage faculty representation in the planning and vision setting

with regard to pedagogy and mandated use of DTTL (Baltaci-Goktalay & Ocak, 2006; Haymes,

2008; Jacobson, 1998). "Leaders seldom understand the technology they mandate, their

directives frequently have a negative effect on faculty's willingness to adopt technology for use

in the classroom" (Haymes, 2008, p. 68).

  The role of peers in DTTL adoption. An individual's subjective norms, or social

influences, can have a positive effect on that individual's sense of perceived usefulness of a

system when they are aided in building confidence with that system while also improving their

standing and influence within their social system, consequently improving their work

performance (Venkatesh and Davis, 2000). The next question pertained to the interviewees' own

social system, specifically their faculty peers, either in their program team or in their school; in

an effort to better understand the subjective norms, and influences of peers on those normative

believes for each interviewee. The question asked participants to "describe the role of [their]

peer group in supporting or enabling [the interviewees'] adoption of a digital technology in their

practice."

  The coding for this question was quite straightforward in that all of the interviewees were

very clear in their beliefs regarding the current role, or desired role of their peer group. A first

pass was done to confirm whether or not each interviewee saw a role for their peer group when it

came to their adoption of digital technologies for teaching and learning (DTTL). Although only

13 of the 14 interviewees acknowledged directly that faculty peers do in fact have a role in

supporting or enabling DTTL adoption in their practice, a role for faculty peers was ultimately

divulged by all interviewees. It was a second pass of coding that revealed defined roles for

faculty peers could be categorized as one or more of the following: (a) supportive and

encouraging, (b) collaborative, or (c) sharing their knowledge and experiences. The following

responses from individual interviewees illustrate peer influences on subjective norms (ISN)

though the various identified roles.

> *DT66U8 Response:* They are supportive absolutely, I mean I'm the one who teaches the [program discipline] stuff so my colleagues are supportive and I've talked to other colleagues, part timers who have to teach in [another] program that are all on board too. We have a great program team, hands down very cohesive unit. (ISN), (Supportive)

> *DT71X4 Response:* It was this new colleague, he's been a crutch for me in the sense that I've been pushing certain things in the program and it seems like my goals were just lost but now that I have this crutch that is, working hand in hand we're going to get going. (ISN), (Supportive, Collaborative)

> *DT31M5 Response:* I was just at a meeting of a faculty learning community…regarding the online hybrid delivery models so that's sort of my support. That's where I get new ideas, you know, we look at other assignments, how you switch an assignment that was maybe traditional into an online environment, things like that. (ISN), (Sharing)

Venkatesh and Davis (2000) assert that "subjective norms have a significant direct effect on

usage intentions over and above perceived usefulness and perceived ease of use for mandatory

(but not voluntary) systems" (p. 198) which is further supported by Lu, Yao, and Yu (2005).

The following response from an interviewee who stated that there was not a role for their

faculty peers goes on to express that the role does exist and it is one that can be best described as

non-interference and as such an influence on this individual's subjective norm.

> *DT40T3 Response:* I've been a bit of a loner; I just get more done if I'm not interfered with. My peer group does not push digital technologies on me; most of my peer group don't use the digital technologies as much as you might think they do. (ISN), (Non-Interference)

One other interviewee described a very negative environment where a group of faculty peers attempted to prevent the adoption of DTTL. The following response from that interviewee describes their faculty peers influence on subjective norms with the role of that faculty peer group being defined as not supportive, not encouraging and to a certain degree, threatening.

> *DT24V8 Response:* I had conversations in bathrooms, where [faculty peers] wanted to know exactly what it was that I was doing in my classroom so that they knew whether or not they should feel pressured to do something different in theirs because they did not want for any student to insist that they do something different. Administration was going to go ahead and develop these courses because they hear that people wanted them and we are a business just like anything and you listen to your consumer and that students wanted these courses and so they invited part time faculty to step up and get a paycheque, which most of us were pretty happy about so we got involved in that. Well I was pulled into [a faculty] office and I was told that if I did this I would never work at that college again and I would never get a full faculty position. (ISN), (Not Supportive, Threatening)

This response also underscores the importance of engaging all parties in the college in planning for, developing and implementing college-wide DTTL adoption. Jacobson (1998) suggests that although it may seem simpler to attempt a mandated solution without consultation with faculty, there may be attempts by faculty to covertly sabotage those attempts. Wilson (1998) further sustains that faculty "will, in turn, seek to undermine the technology agenda through passive resistance and disengagement" (My Own Life section, para. 5).

A follow-up to this interview question asked interviewees if they could "provide details of an instance of one or more of [their] faculty peers motivating [the interviewee] to adopt a digital technology into [the interviewee's] practice or to adopt a new method of teaching" followed by a final follow-up question asking if they consider that adoption of DTTL successful. Overall there were five interviewees who related stories of adoption based on the influence of faculty peers, with all of them considering the adoption successful. The following are two of

those individual responses indicating the positive influence of faculty peers' influences on

subjective norms (ISN) and the roles those peers took in the adoption.

> *DT58I2 Response:* In a team teaching environment where we both brought to the table sort of our own views on things and the discussion and amalgamations, to actually make it work. I think there were all sorts of additional techniques that I was able to explore facilitate from [my teaching partner] and other things that you know I might have wanted to put forward and [my teaching partner] supported; that translated it from just an idea into practice. (ISN), (Collaborative)

> *DT75J9 Response:* Case in point, the acceptance of electronic assignments instead of paper based assignments. I was bound and determined; I wasn't using that bloody LMS exactly because I was so worried about what would happen and what if I had a glitch because I didn't feel comfortable with it. And how do I physically mark the paper because I'm a communications teacher, circle things and comment on the paper? A peer said "let me show you and then, I'll be your lifeline throughout the semester if stuff hits the fan." So that motivated me to give it a try. It worked out really, really well with minimal issues and my support was there when I needed it. (ISN), (Supportive)

Finley and Hartman (2004) posit that faculty use the term collaboration when relating their

interactions with faculty peers in a very broad sense "to refer to many things, including the most

casual discussion of an idea while standing in a colleague's office doorway" (pp. 327-328). This

may explain why there were so few examples of peers influencing an adoption while so many

interviewees described their faculty peers as supportive, encouraging, collaborative and, or,

sources of shared experiences and knowledge.

The role of administrators in DTTL adoption. The next question in the interview

asked interviewees to "describe the role of the dean and college leaders in supporting or enabling

adoption of a digital technology in [that interviewee's] practice. Influences on subjective norms

come from a variety of sources beyond faculty peers including students and administrative

leaders (Ajzen & Fishbein, 1980; Taylor & Todd, 1995). This question was designed to elicit

details of those specific influences on subjective norms by administrative leaders, to explore the

effect institutional norms have on an individual faculty member's adoption decision and to

discover any institutional supports that must be in place to enable a successful adoption. The

first level of coding applied to the responses determined that, in fact, all 14 interviewees saw a

role for their deans and other administrators when it came to the individual interviewee's own

digital technologies for teaching and learning (DTTL) adoption decisions. A second coding pass

was made to identify the types of roles college deans and administrators held, or should hold in

the opinion of the interviewees. A final coding pass undertaken on the responses to this question

to align the roles identified to factors from the modified decomposed theory of planned

behaviour (DTPB) and the three factors that emerged were, in order of the frequency with which

they occurred were: (a) resources or other institutional supports, (b) perceived behavioural

control, and (c) institutional norms.

　　　　With regard to resources or other institutional supports, many of the roles that

interviewees saw for their deans and other college administrators fall under the categories of

support for time, training and licensing of software and facilitating technical or classroom

support all of which require financial support. The following three individual interviewee

responses highlight some of those different institutional supports (IS) that deans and other

college administrators could provide.

> *DT75J9 Response:* I think the obvious role is to provide me with time to learn, the expertise to support me in that learning but I think their other role is to fully understand what it is that they are asking of me. (IS), (Time)

> *DT75Q3 Response:* Well, I guess more I think about support, there are different technologies I'd like to have access to that we don't have licences or institutional support for so that would be where I'd see from a higher level, where they would maybe be responsible for that...finance and other resources, a lot of the time, we need support from IT. (IS), (Licensing, Financial, Time, IT Support)

> *DT71X4 Response:* Anytime you try to justify something that is going to benefit the student learning, [my dean] is up for it. [My dean] would try to find some money however she could and try to help you, which is a great role for a dean or an administrator. (IS), (Financial)

Lau (2011) and Taylor and Todd (1995) both found institutional supports, or "the availability of

resources needed to engage in a behavior, such as time, money or other specialized resources"

(Taylor & Todd, 1995, p. 150) to have a direct impact on perceived behavioural control in an

adoption decision. Additionally, it is critical that individual faculty member's personal decision-

making on whether DTTL is adopted or not is considered thoughtfully by, and supported through

consultation with, college administrators as reinforced by Jacobson (1998) and Sugar et al.

(2004). It is in this way that a level of perceived behavioural control regarding opportunity and

the level to which external factors supports or impedes a specific behaviour (Ajzen, 1991; Taylor

& Todd, 1995).

The interview responses that aligned with the perceived behavioural control factor all

defined existing or desired roles for deans as either supportive through trust and empowerment or

supportive through consultation with faculty on DTTL adoption plans allowing faculty the

control to implement a DTTL that they believe is effective and brings value to their practices.

The following three individual interviewee responses illustrated the desire for, or existence of

perceived behavioural control (PBC) based on the respondents' relationship with their dean.

> *DT66U8 Response:* In my opinion, the role of the dean should simply be to approve it and take my word that it's a good thing to do, a certain amount of trust. It won't have any effect on cost and it engages the students, it's better for them. (PBC), (Trust)

> *DT58I2 Response:* I wanted to adopt a technology and a methodology that required more reasonable class sizes that smacked up against the problem of the workload formula and section sizes and that was challenging. Obviously [the dean] had the pressure to have larger class sizes. Generally speaking, I feel pretty good about the ability to negotiate [with my dean]. I think I've had other deans in past where I know that if I didn't have the ability to negotiate it may have negatively affected what I could do. (PBC), (Consultation)

> *DT31M5 Response:* It was a decision that we made collectively, I think, *laugh*, having said that, I can't know exactly what was in [my dean's] head but the way it was presented to me was "yes, why don't you try it online" and I've gone back since, [my dean] said "which mode of delivery do you want to use?" He certainly saw that [my course] could be an online course but did not mandate me to do it that way. (PBC), (Consultation, Empowerment)

To a lesser degree, some of the interviewees described roles for their deans and other

administrators that aligned with institutional norms (IN), either in setting or enforcing those

norms as the following two responses from individuals describe.

> *DT96A6 Response:* The professor should pretty much be able, with obviously reasonable
> guidelines, to determine testing and technology. I mean [administrators] can encourage
> the use of technology but their role should be in regard to broad policies; the college
> wants you to use [institutional LMS] grade book. (IN), (Setting Norms)

> *DT58I2 Response:* So I think that management should be playing a little bit of a role in
> keeping faculty accountable for things that they're pushing for, in terms of new
> methodologies or adopting new technologies; let's look at how effective that was, I
> would accept that in my practice. (IN), (Enforcing Norms)

In the modified DTPB depicted in Figure 1, and as supported by Dacin (1997) and Yew Wong

and Boon-itt (2008), institutional norms stand as the expectations, or standards of performance

regarding the use of DTTL in an individual faculty member's practice. Those standards may be

in conflict with faculty beliefs and values within the context of their teaching practice and as

such may affect an individual's degree of compatibility resulting in a shift in attitude concerning

an adoption decision (Tornatzky & Klein, 1982; Rogers, 2003; Ajjan & Hartshorne, 2008; Lau,

2011).

A follow-up question was asked regarding a dean or other administrator having motivated

the interviewees to adopting a digital technology or new teaching method in the interviewees

practice. There was only one instance of this occurring among the 14 interview participants and

that response is presented below.

> *DT31M5 Response:* Yes, with my course, doing it online. [My dean] sort of presented it,
> told me that I could go to [in house training] in my spring term and then develop over the
> semester so he gave me time to develop the course on my SWF. It was a decision that we
> made collectively. (PBC), (Consultation, Empowerment); (IS), (Time, Financial)

This may have been a case of gentle persuasion regarding a move to more online course

development but it is clear that this interview respondent appreciated the dean's approach in

more of a collaborative, motivational way such as could be expected from individuals in a faculty peer group.

Recognition for adopting DTTL. Finley and Hartman (2004) suggest that reward or recognition of some sort should be provided to faculty in the form of release time, funding for training, or funding for training or collaboration in addition to regular teaching hours. In keeping with Finley and Hartman (2004), the goal for the next question in the interview was simply to identify if recognition of any type was appropriate for a successful digital technologies for teaching and learning (DTTL) adoption, either mandated or not mandated and if so, what types of recognition would be appreciated by faculty. All 14 interview participants agreed that some sort of recognition would be appropriate, albeit to varying degrees.

When reviewing the responses to this question, it became very clear that there were three types of recognition, all of which align with the institutional influences on subjective norms (ISN) factor as part of the modified DTPB. Groff (2013) and Laurillard (2011) recommend a need for administrators to offer recognition in the form of opportunities to share adoption success experiences with the greater faculty community. The opportunity to share experiences and successes was cited by most of the 14 interviewees as the type of recognition they would appreciate and is illustrated by the following responses from individual interview participants.

> *DT58I2 Response:* I guess the opportunity to present, I mean to present at internally or externally at a conference, those types of things, that might be an appropriate thing. (ISN), (Share Experiences)

> *DT31M5 Response:* I don't know, it could be something as simple as in program or school meetings, just saying this year we had *x* amount of new programs, some were online, some used this, you know, showing a best practices, that people have developed and so on. (ISN), (Share Experiences)

> *DT75Q3 Response:* A lot of it is in just sometimes having an opportunity to share what they're doing – showcasing. (ISN), (Share Experiences)

An almost equal number of responses reported reward in the form of student satisfaction with

faculty efforts as the most meaningful type of reward as stated in the following individual

interviewee responses.

> *DT93L2 Response:* I don't see the recognition coming from administration; I see that kind of recognition coming from the students and to me that's more valuable. When I have an evaluation, what I hear from the students is more valuable than my dean coming into my class for 45 minutes. (ISN), (Student Satisfaction)

> *DT96A6 Response:* When a student comes up and says you're the best prof that I've ever had over the years, or I love this course; that's my satisfaction. (ISN), (Student Satisfaction)

> *DT62C6 Response:* For me, I like the recognition from my students where they've enjoyed something then I feel better about myself and that's really all I need. (ISN), (Student Satisfaction)

To a slightly lesser degree, other interview participants indicated that the type of recognition they

deem important is the appreciation of their faculty peers. The following individual responses to

this interview question demonstrate faculty appreciation as recognition.

> *DT66U8 Response:* I think for me personally, I have the appreciation of my colleagues. I have a good relationship with my colleagues, we recognize that we work off each other and we support each other and we're a good team. (ISN), (Peer Satisfaction)

> *DT24V8 Response:* My peers, what I've started to hear, and it's kind of special for me, is recognition coming through other people's successes as they start to adopt these things and share with their peers what it is that they're doing and I've had a hand in that. Hearing others accept, and be excited by what those individuals are doing and then leaving saying, if they can do it I want to do it and that's all because of something that I was able to have a hand in, getting that person started. (ISN), (Peer Satisfaction)

"Administration must recognize that in order to drive change they will have to be aware of the

culture they promote and emphasize excellent teaching in their technology integration plans"

(Jacobson, 1998, p. 195). It appears that the best reward or recognition that administration could

provide to faculty in an effort to increase adoption of DTTL by those faculty is the opportunity to

be celebrated by their peers and others in the institution. It is through those positive peer and

institutional influences on faculty subjective norms that faculty intention to adopt DTTL in their

practice will ultimately intensify as supported by Ajzen and Fishbein (1980).

Future DTTL adoption. The final question in the interview asked participants to identify a digital technology that they would like to adopt in their practice, but feel that they aren't able to due to a lack of knowledge, support, time, or comfort level. The aim of this question was to get to the distinct factor that is holding each individual interviewee back from moving forward with an adoption of DTTL. This was achieved by following-up the first part of this question with a related question: "What personally is required for you to feel confident in adopting [the DTTL identified by each interviewee] into your practice?" The purpose of this study is to compile a list of factors in the form of tangible entities or actions that could be provided to faculty members in an effort to increase their adoption of digital technologies in their teaching practices. This question gave a final opportunity for each interview participant to take the time to reflect and carefully consider what factor or factors are critical to them in their own decision to adopt DTTL or to adapt to new teaching methods that employ or leverage DTTL.

In response to the first part of the question, 13 of the 14 interview participants named specific DTTL that they would like to adopt in their practice; an initial coding of those responses was undertaken to discover what types of digital or Web technologies the interviewees were interested in adopting. What resulted was a diverse list of digital hardware, software tools and Web tools including: (a) Web conferencing; (b) building learning objects; (c) course gamification; (d) lecture capture; (e) implementing LMS tools for testing; (f) having students create digital artifacts of their learning throughout a term in place of a final exam; (g) integrating the use of tablets and other smart devices in the classroom; and (h) smart device apps for simulations, emulators, and problem solving.

Coding was then undertaken on the second part of this final interview question to determine the factors that would be necessary for each of the interview participants who were

looking to adopt DTTL in their practice. This was followed by a final pass to align those factors

to the modified decomposed theory of planned behaviour (DTPB) implemented in this study

with the institutional supports factor emerging as prominent throughout most responses. Time,

money, technology, plus any necessary technical or organizational supports all can be

characterised as institutional supports (Taylor & Todd, 1995). The primary discrete element of

the institutional supports factor that materialized through the responses to this question was time.

Lack of time is a significant barrier to digital technologies for teaching and learning (DTTL)

adoption (Beggs, 2000; Brzycki & Dudt, 2005; Laurillard, 2011). The following responses from

individual interview participants outline the need for increased institutional support (IS) for time

to explore, train, collaborate, implement, and practice.

> *DT51O6 Response:* Well knowledge that we would be supported in having the same
> recognition for the hour, because if we are really going to do it well, I mean really do a
> fantastically developed one hour piece where they are having to view, they're having to
> look at animations, questions and have discussion online with the professor, that it's
> acknowledged as such, because that's a huge amount of work. People in charge of the
> SWF are so far away from that teaching environment, that I think they've lost or they're
> not aware of the amount of preparation. (IS), (Time to Implement)

> *DT75J9 Response:* So I need time to investigate what's out there and learn otherwise, I'm
> trying to fit in between everything else and it's a best intention that never gets realized.
> (IS), (Time to Explore, Time to Train)

> *DT66U8 Response:* When it comes down to reality, it's time but it is illusive, well two
> hours a week is great, but it's really not. I want to be able to give it my all and it's not
> just that I want to research and develop, there are so many little things, but the technology
> itself and developing the technology, developing my program content and the way I
> teach. Certainly I would love to have a dedicated semester where, again, there's that trust
> issue, I know there needs to be accountability, don't get me wrong, I don't want to come
> across saying that you just need to leave me alone for two semesters. What I'd love to
> have is at least every other summer; two months and at the end of two months submit a
> report of what you did. (IS), (Time to Explore, Time to Implement)

> *DT31M5 Response:* That's my big issue, to take the time, I could certainly go in there
> and try it myself, trial and error, but that takes a lot of time. And I just find that we are so
> busy to begin with that to do that…you know or even, you know, a colleague that is using
> these types of tools, to be able to show us their best practices. (IS), (Time to Explore,
> Time to Collaborate)

"Technology integration takes time; time to learn about the innovation, time to be adequately prepared to use it" (Afshari et al., 2009, p. 96). To a lesser degree than time, training as a theme also emerged from the responses to this question, not only in conjunction with time to train but in terms of what types of training faculty would see as practical and useful in their pursuit of the appropriate knowledge and skills to adopt a specific DTTL in their practice. In addition to traditional professional development, some faculty would like to see increased institutional supports (IS) in the form of opportunities to engage in mentoring and one-on-one training or advising such as the following responses from three individual interviewees demonstrate.

> *DT60N9 Response:* Personally I think I'd have to work with others who've used it and have them, do a lesson or workshop or course [before I] feel comfortable using it. I might be more comfortable using technology more frequently in class once I've had someone else tell me [I'm] ok with this, you've demonstrated that you know what you're doing in a supportive environment now go out on your own and use it. (IS), (Professional Development, Mentoring)

> *DT42E9 Response:* The way I would prefer to learn it would be one-on-one, somebody supporting me as I do one assignment, and not me struggling like I've done it before, and I can learn. So if I have an idea of what I want to do and somebody can just step me through it, so that quick little one-on-one tutoring, I would more likely use it than if I was just to suffer through on my own to figure it out. (IS), (One-On-One Training)

> DT58I2 Response: I think that for me, it's going to be talking to some of my colleagues who are in different program areas. I would like to sit down with that person and see what they do and how they do it, I just need a little but more feedback from folks that have actually experienced it. (IS), (One-On-One Advising)

Jacobson (1998) suggest that a "just-in-time, one-on-one access to colleagues" (p. 97) could be an effective approach to training faculty who are willing to experiment with new DTTL. Again this requires time, time for the faculty member who is experimenting as well as time for the individual who is mentoring or providing that just-in-time training.

To a lesser degree than either time or training, some responses to this question indicated that perceived usefulness was a necessary factor when considering an adoption of DTTL in a teaching practice. In keeping with Ajjan and Hartshorne (2008), perceived usefulness is the

degree to which individual faculty believe that using DTTL will improve their teaching practice.

Finley and Hartman (2004) find that faculty will explore new DTTL if they believe it is

pedagogically beneficial. The following responses from two individual interview participants

underscore the need to consider perceived usefulness for faculty within their own teaching

practices.

> *DT24V8 Response:* I have to go back to learning theory and to my purpose for doing
> anything which again, helps me understand why it is that I want to do it in the first place.
> (PU)

> *DT62C6 Response:* Additionally, I would love to use some sort of conferencing software
> but one of the limitations with that is that administration has a very specific view point of
> what online courses are and they want them to be asynchronous because then they can
> market it to. I think having administration to say yes, this is appropriate, yes we can give
> you synchronous classes, yes we're listening to what you actually need as an online
> instructor, would be lovely. (PU)

The single interview participant who was not planning on adopting any new DTTL in

their practice indicated that instead, they were considering reducing their use of some

components of the institutional LMS that they currently employ. This individual advances that

posting content in the form of lecture notes for students may be responsible for some students not

attending class and not having the advantage of interaction and engagement through problem

solving in class. The following comment from this individual interviewee emphasizes that

concern and consequently a low level of perceived usefulness (PU) of DTTL in their practice.

> *DT96A6 Response:* Some students assume the notes are the class but there is more to the
> class than just the notes. There's the lively interaction and the mistakes in the problems
> that we sometimes try to solve. We do lose some of those students that didn't come to
> class because the notes were posted. So if I don't post notes, maybe we can save those
> extra two or three students that fail a class every year. Maybe it would hinder some of
> the students who use the notes afterwards. It's a tough call to make. (PU)

Interpretation

    Current DTTL usage. Faculty are using digital technology in their teaching and

learning practices to communicate with students, deliver learning materials and content to

students, assess student progress, provide feedback to students on their progress, and to manage

student grades. These tasks are being predominantly carried out through the use of the

institutional LMS with some faculty implementing a variety of other software packages and

websites, and others who are successfully using various social media tools in their practices. In

addition, faculty are looking to increase their use of digital technologies for teaching and

learning (DTTL) in a variety of ways including: (a) greater use of components within their

institutional LMS, (b) integration of smart devices and apps for those devices in classroom

learning, (c) video conferencing, (d) course gamification, and (e) the incorporation of student

produced digital artifacts of their learning to be shared with future learners. The DTTL tools that

faculty report using are increasingly allowing students the freedom to choose where they learn,

when they learn, and the pace of their own learning. Furthermore, some faculty are currently

using DTTL tools that allow students to contribute to the teaching and learning environment

while still others in faculty are investigating tools that could change their teaching and learning

environments in even more dramatic ways. As the pace of innovation in digital technologies

increases, is it possible to predict which DTTL tools will bring the most salient value to students

and faculty, and how will practices of teaching and learning be changed through implementation

of those tools? Shirky (2010) suggests that "is the paradox of revolution….the bigger the

opportunity offered by new tools, the less completely anyone can extrapolate the future from the

previous shape of society" (p. 189). Rather than attempt to predict which approach to teaching

and learning with DTTL, can administration and faculty work together to build culture of sharing

best practices, exchanging ideas and identifying challenges, in an effort to shape a higher level of

learning experience for students that all stakeholders strive for?

      DTTL usefulness and added value. DTTL tools are perceived as useful by faculty,

however, the degree of usefulness is tempered by reservations regarding the appropriate use of

DTTL to support teaching and learning within faculty members' practices and with regard to

specific subject matter needs. There are many benefits to a teaching and learning practice

through the use of DTTL; the most notable benefits to faculty are improved interaction with

course content and with their students. Faculty also see benefits to students in improved

interactions between students and course content, between the students and their teachers, and

with other students. Those improved interactions provided through the implementation of DTTL

can provide added value to a teaching and learning practice with many faculty members realizing

an added value for themselves through increased efficiencies in communicating with students,

managing student assessments and grades. The added value that some faculty see for students is

in the ability students have to source content beyond what can be provided by the faculty

member in the classroom and to keep track of their own progress in a course through the real-

time updating of grades. Are the improvements realized by some faculty and their students

through enriched interactions with each other and with content enough to see widespread

adoption of DTTL in teaching and learning practices as useful improvements to all teaching and

learning practices? Anderson (2008) suggests that there is no "formulaic specification that

dictates the type of interaction most conductive in all domains and with all learners….teachers

must learn to develop their skills so that they can respond to both existing and emergent student

and curriculum needs" (p. 67). Perhaps rather than be concerned with the benefits faculty might

realize through the use of DTTL tools, the focus should be primarily on the student and the

curriculum to really achieve a teaching and learning environment that is responsive, rather than

prescriptive.

Pressures to increase DTTL usage. Faculty sense little pressure from their peers to

adopt digital technologies for teaching and learning (DTTL). While a few individual faculty feel

threatened by some in their peer group regarding DTTL, in that they might be forced to adopt a

DTTL that they are unfamiliar with or unprepared for causing them to lose control of their

practice, most faculty see their peers as supportive and encouraging regarding changes to their

teaching practice through the adoption of DTTL. It is clear that there is a culture of sharing and

collaboration among faculty who are considering adoption, or who have adopted DTTL in their

practices. Can the culture of sharing and collaboration be expanded upon in a way that would

allow all faculty members to fully realize the potential of the community of knowledge and

experience so to increase their personal capabilities regarding the adoption of DTTL? Shirky

(2010) suggests that rather than put emphasis on any particular technology, those who have the

experiences and capabilities with a technology are obligated to provide opportunities for their

peers to build their own capabilities with that technology and subsequently build a "culture of

groups" (pp. 191-192).

     Deans and other administrators are applying pressure on faculty to utilize the institutional

LMS for a variety of tasks and to varying degrees college to college. Typically faculty see the

role of the Vice President Academic (VPA) as the administrator responsible for policy setting

regarding the use of the LMS. Deans have taken on the role of supporting and encouraging the

use of the institutional LMS, and to a slightly lesser degree, re-enforcement of policy on the use

of the LMS through faculty evaluations. With regard to the development of online and hybrid

courses some faculty are feeling pressured to move to this type of course delivery based on

recommendations or suggestions from their deans. Although not mandated, the sense is that

there is an expectation by the VPA and others in executive leadership that more online and

hybrid course development should be undertaken by faculty. Should college leadership abandon

mandated or one size fits all policies in an effort to increase the use of institutional LMSs and the development of online and hybrid courses? Lewin (1951) recommends that rather than simply set a new level of performance for the group, the goal of achieving a certain level of DTTL use for a desired time should be considered to avoid the group retreating to the previous level of use, or non-use. Fullan (2007) would describe this as "establishing the right blend of tightness and looseness" (p. 43) in driving for institutional change. Strongly mandated change might lead to results, but only for a limited time and only to a certain level. Conversely, if faculty are given more freedom and the resources to do with as they see fit regarding their practice, any urgency for change is lost (Fullan, 2007).

Time as a factor leading to adoption of DTTL. Time is a key factor necessary for faculty to feel comfortable in adoption of digital technologies for teaching and learning (DTTL), time to explore, time to experiment, time to learn, time to plan, time to collaborate, time to implement and time to evaluate DTTL. Time should be provided to faculty to allow them to acquire the knowledge and skills necessary to implement DTTL into their practices. Administrators should consider providing time to faculty in a way that suits each faculty member's learning needs. Time could be provided through: (a) release time on their SWF in the form of a one or two course release; (b) freedom on a regular basis, if not every year, perhaps every other year, from administrative and teaching duties that have slowly eroded the traditional spring semester planning period; or (c) professional development leave for one or two semesters to immerse themselves into the various DTTL in an effort to learn and grow with those technologies before full implementation in their own practice. A less structured approach to providing time for faculty should also be investigated to allow faculty time for: (a) dialoging with other faculty who have used specific DTTL in their practice on an ad hoc basis for support

and training; (b) a formalized system of one-on-one training and support or mentoring whereby a

faculty member who has used a specific DTTL successfully in their own teaching practice could

work with another faculty member who is implementing the same DTTL in their own practice;

and (c) collaborating with other faculty in planning and deployment of a new DTTL that fits

within each of their distinct teaching and learning practices.

Certainly any faculty collaboration, ad hoc support, one-on-one training or mentoring all

require time, not only for the faculty member who is looking to gain knowledge and experience

with DTTL, but also for the faculty member who is collaborating with, supporting, training, or

mentoring their colleague. "Teachers constantly feel the critical shortage of time. And there are

few intensive, ongoing learning opportunities for teachers individually or in concert to deeply

acquire new learning concepts and skills" (Fullan, 2007, p. 24). Is it possible to provide faculty

the necessary time to allow them the ability to move from the day-to-day demands of their job

and re-focus on changing their practice in a meaningful way through the use of DTTL? Fullan

(2007) further indicates that faculty caught up in the day-to-day demands of program instruction

cannot effectively consider dramatic change to their practice when "most strategies for reform

focus on structures, formal requirements, and even-based activities involving, for example,

professional development sessions" (p. 25). Perhaps what is necessary is a critical look at our

traditional system of workload assignment, like the adoption of many DTTL, a front-loaded

commitment of time is necessary to truly realize the benefits to the learning environment down

the road. Rather than attempt to dramatically change teaching and learning practices through

college-wide initiatives or mandated adoption of DTTL, college administrators and faculty

should look to allocating time for opportunities that could lead to "deeper questioning and

sustained learning" (Fullan, 2007, p. 28). This may be the approach required to achieve the

meaningful changes to teaching and learning practices that a successful implementation of DTTL could provide.

      Perceived Usefulness as a factor leading to adoption of DTTL. Faculty have a desire to understand if technology increases the learning for students in their practice or if it simply enhances the delivery of learning materials to their students. If faculty can see the benefit of adopting a DTTL in their practice in terms of enhancing teaching or managing content they seem to be inclined to move to that adoption. Faculty see how some DTTL can improve their teaching through efficiencies in managing content and grades while at the same time, some of those same faculty members worry that reduced student engagement and a possible degradation of the students' abilities to develop the necessary interpersonal communications skills required for a successful career. Can faculty be asked to consider DTTL adoption if they believe that student learning will ultimately suffer due to a lack of face-to-face instruction? "Too much of learning consists of vicarious substitution of someone else's experience and knowledge" (Lindeman, 1926). Faculty should no longer consider themselves as the key source of knowledge for students in their practice. "Students can find out almost anything they need to online, the role of the teacher must change to that of a guide or coach…a partner in learning who helps the students evaluate and synthesize the data they find" (Rushkoff, 2010, p. 59).

      Should faculty consider digital technologies for teaching and learning (DTTL) adoption if they only see perceived usefulness in that adoption for themselves in terms of content management and efficiencies in tasks such as communications and marks management? Students attend college to engage in learning that will prepare them for their future career, as such that learning should "focus more on the process and less on the content being taught….case studies, role playing, simulations, and self-evaluation are most useful" (Kearsley, 2013).

Furthermore, echoing the work of Malcolm Knowles on the concept of andragogy, Kearsley (2013) reiterates that it is essential that "instructors adopt a role of facilitator or resource rather than lecturer or grader." Perhaps a decision to adopt DTTL should depend less on perceived usefulness to each faculty member and more on the perceived usefulness for the students in each individual faculty's teaching and learning practice.

Training as a factor leading to adoption of DTTL. Any institutional strategy for training should include opportunities for training that allows for exploration of new and emerging DTTL as well as ongoing reviews of research on the effectiveness of the use of digital technologies for learning. Can college administrators expand on their excellent existing centralized training departments by supporting faculty mentoring, peer-to-peer support structures and providing opportunities for faculty to share experiences, successes and failures at the program, school and college levels? "Teachers need to participate in skill-training workshops, but they also need to have one-to-one and group opportunities to receive and give help and more simply to converse about the meaning of change" (Fullan, 2007, p. 139). Fullan (2007) further asserts that "purposeful interaction is essential for continuous improvement" (p. 139). It is through this approach that faculty have the opportunity to learn how to use a technology while at the same time allowing them the opportunity to judge a technology's effectiveness and suitability for their own practice (Fullan, 2007).

Other institutional supports as factors leading to adoption of DTTL. In addition to time, and the added cost of that time through modifications of faculty workload, many in faculty see the need for improved institutional supports in terms of funding for external professional development and licensing of DTTL that differs from existing institutional technology. Additionally, there is a need for improved efficiency and ongoing reliability of existing and new

systems that provide a dependable user experience and reliable technical and classroom support. This also potentially puts a further financial burden on institutions that are continually facing funding that is falling behind rising costs. Can colleges in Ontario find the funds necessary to support faculty through additional non-teaching time, expanded licensing, improved technical support, and additional professional development? "A salient feature of Ontario's funding arrangements is that there is no explicit discussion of what the cost is, or should be, of educating a student or carrying out the other functions of a university or college" (Clark, Moran, Skolnik, & Trick, 2009). If as Clark et al. (2009) suggest, that the only way to increase funding in a system that funds based on enrollment, is to increase enrollment, perhaps colleges need to seriously consider the reallocation of funds from some less critical business areas to initiatives that support increased student learning and success through expanded use of DTTL. "There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things" (Machiavelli, 1513, p. 25).

       Institutional Norm as a factor leading to adoption of DTTL. College faculty are being encouraged to increase their adoption of digital technologies for teaching and learning (DTTL) in their practices, specifically with regard to the use of the institutional LMS, the development of new online and hybrid courses and the conversion of existing courses to hybrid or online. While some faculty believe that administrators at their colleges are well informed on the use of DTTL, others see the push to greater adoption of DTTL as a move to add value for their college in the ability to promote anytime, anywhere learning and to increase capacity in the institution without increasing physical space. Faculty require evidence based on research and on measured increases in student satisfaction in order to see how improvements to teaching and learning could be realized through the adoption of DTTL. There is a belief that college leaders

have a limited view of how DTTL should be implemented to best improve teaching and learning.

Is the added value realized by many individual faculty members, and their students, enough to

override the concern held by several faculty members that administrators at their college are

simply promoting adoption of DTTL in an effort to achieve greater efficiencies and marketing

opportunities for their college? With so many individual faculty seeing improvements to their

teaching and learning practices it is clear that there are benefits to be gained through an increased

use of DTTL. At the same time, each faculty member must fully understand how to best realize

those benefits in their own practice before moving headlong into the changes necessary.

"Change occurs in a system in dynamic equilibrium, but it occurs at a rate that allows the system

to adapt to it" (Rogers, 2003, p. 453). Rogers (2003) further explains that "stable equilibrium

occurs when almost no change is occurring" (p. 471) and subsequently that "disequilibrium

occurs when the rate of change is too rapid to permit the system to adjust" (p. 471). College

administrators should promote DTTL adoption that is supported by research to help alleviate the

concerns of faculty that a particular DTTL adoption is appropriate for a particular teaching and

learning practice in an effort to achieve a level of dynamic equilibrium within the college.

Compatibility as a factor leading to adoption of DTTL. Faculty maintain that they

should be leading the research, planning, implementation and evaluation of DTTL rather than

leaving it in the hands of college and IT leadership who may not necessarily understand the

needs of students in a particular teaching and learning environment. Can college leadership trust,

that by giving the opportunity to faculty to lead research into the appropriateness of DTTL for

students and their practices, as well as any subsequent planning for, implementation of and

evaluation of that DTTL, that faculty would increase their adoption of DTTL in their practices?

Whether or not a specific DTTL fits in with pre-existing faculty values, experiences and needs

stands as a measure of compatibility of that DTTL (Rogers, 2003). Rogers (2003) further

maintains that "the compatibility of an innovation, as perceived by members of a social system,

is positively related to its rate of adoption" (p. 249).

The rewards of successful DTTL adoption. The reward for faculty in a successful

implementation of DTTL comes primarily from student success and an appreciation by students

of faculty efforts. Recognition is also realized by faculty in the appreciation of their peers.

Recognition of a faculty member's successful efforts could be provided by administrators

through opportunities for faculty to share their own successes and experiences with other faculty

in their program group, their school, across their college or at teaching and learning conferences.

Faculty have ongoing plans for continuing adoptions of DTTL in their practices for the current

semester or within the current academic year. Are faculty attitudes toward DTTL transformed or

are their approaches to teaching and learning transformed through a successful implementation

of a DTTL? Mezirow (1991) advances that transformation in attitudes and beliefs are achieved

through a sense of proficiency that is developed through experience. Furthermore Mezirow

(1991) states "success leads to a new action pattern that is directed by reflection and based upon

transactional and discursive dialogue" (p. 162). As students and peers recognize the successful

implementation of DTTL in a teaching practice, and through the sharing of those experiences

with other faculty, can college administrators expect to realize the improvements they desire and

gain ground in attracting and retaining students? College administrators need to acknowledge

that "significant educational change consists of changes in beliefs, teaching style, and materials,

which can come about only through a process of personal development in a social context"

(Fullan, 2007, pp. 138-139).

Conclusion

The purpose of this study was to develop a list of factors that influence college faculty in a decision to adopt digital technologies in their practice. This was accomplished through an examination of current usage levels of digital technologies for teaching and learning (DTTL), the factors behind the decisions to adopt those DTTL in individual faculty's practices, concerns that faculty have regarding further adoption of DTTL in their practice, faculty views on where DTTL should be situated in a teaching and learning practice, and whether or not DTTL is changing teaching and, or, learning in any significant way. Given the necessary time and opportunity to learn the skills, collaborate with their peers, and implement successful changes to their teaching and learning practices, as measured by student success, through the adoption of DTTL and rewarded with rich opportunities to share their experiences with other faculty, college administrators may realize an increase in the usage of digital technologies in faculty teaching practices.

While this study employed a mixed methods approach to data collection, future research in this area might also include faculty focus groups in an effort to leverage the sense of community and collaboration that emerged through the interviews undertaken in this research. Future researchers in this area could also consider a longitudinal approach in an effort to test the prevalence and progress of adoption over time. This study was undertaken to discover factors at play in DTTL adoption, not as an attempt to study individual behaviour. Consequently a clear limitation of this research is that data was collected at only four Ontario colleges. Further research should include a larger population from all colleges across the province in an attempt to build a comprehensive list of all of the factors at play in a decision to adopt DTTL in a teaching practice. Future research with a larger population or over a longer timeframe might yield

differing results requiring additional factors be included or resulting in some existing factors

being modified or removed.

The modified decomposed theory of planned behaviour (DTPB) implemented in this

study appears to be a sound framework for the study of digital technology adoption decisions by

college faculty. At the same time, future research might also be conducted using that same

modified DTPB as a framework to study digital technology behavioural intentions, or decisions

to adopt by college students in Ontario. Armed with such research those results could be

compared with the results of this and other research on faculty decisions to adopt to discover if

the factors at play in adoption decisions for students are in any way similar to the factors that

influence faculty decisions in adoption of DTTL. Furthermore, such research might yield some

interesting data on the alignment of desired levels of adoption or whether current faculty

adoption of digital technologies in their practices aligns with student learning needs.

A further limitation of this study is that the focus was on a broad category of DTTL.

Perhaps future studies could focus solely on decisions to adopt online or hybrid learning delivery

modes or the use of social media tools for teaching and learning. This type of data would be

helpful in providing information for college administrators and faculty who are considering the

appropriateness of either of those digital technologies at their colleges in existing teaching

practices.

This research study has given rise to a number of questions regarding the culture of

faculty groups, the need for institutional change, and the best approach to teaching and learning

for students attending college. This study has also identified a number of challenges regarding

implementing the changes necessary for an enriched learning environment that leverages the

power of digital technologies, the capacity that colleges have in supporting and financing those

changes, and the need for faculty to re-evaluate their roles in their own teaching and learning

practice and their current approaches to teaching and learning. Future research should focus on

those questions in an effort to help colleges and faculty meet the identified challenges so that

effective transformation in higher education can take place, in particular, in colleges in Ontario.

Digital technologies offer the opportunity for faculty and students to reshape their

teaching and learning environments, and redefine the roles of teacher as the provider of content

and student as the consumer of content. Working with digital technologies inside and outside of

the physical or virtual classroom, faculty and their students can become partners in teaching and

learning through improved interactions and access to content. With the enriched learning

environments that digital technologies can support and encourage, colleges in Ontario could

become leaders in providing learning that nurtures the development of real-world problem

solving and communication skills required by today's and future graduates. Additional and

ongoing research is essential to building an understanding of how faculty culture and institutions

can support the changes necessary and to identify the best approaches to implementation of

appropriate digital technologies that would best support learning for today's students as well as

future generations of college learners.

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Endnote

[1]Wherever the words behavioural or behaviour appear within a direct quotation, or as part of a theory name taken from existing research, the American spelling, *behavioral* or *behavior* are used when it reflects the spelling used in the original source. In the remainder of the text the English spelling, *behavioural* or *behaviour* are used.

Appendix A

Online Survey Tool

Understanding Factors that Influence College Faculty in Deciding to Adopt

Online Survey Consent

Dear Ontario College Colleague,

Thank you for your interest in this study. This is a request for your consent to participate in the study by responding to a short online survey. The purpose of the study is to identify influencing factors that may lead to adoption of digital technologies in teaching and learning at community colleges. This study is being carried out by Kevin Dougherty, Professor School of Business, IT and Management at Durham College, as a requirement of completion in the MA Education, UOIT. Participation in the study is completely voluntary.

The survey is made up of 12 multiple choice, multiple selection questions and four short answer questions. The questions focus on your personal adoption of digital technologies, your beliefs regarding the use of digital technologies, and any personal motivators that led to, or may lead to, adoption of digital technologies in your professional practice. Initial testing of this survey indicates that it will take 15-20 minutes to complete. You may exit the survey at any time; only completed surveys will be included in the data analysis.

At the end of the survey, you will be asked if you would be willing to participate in a 30-40 minute follow-up interview to be conducted face-to-face during the months of May-June, or August-September, at a location convenient to you. If you choose to participate in an interview, you will be asked for your contact information. If you do choose to provide your contact information, you may or may not be contacted to arrange an interview.

I want to emphasize the following important points:

• Participation is voluntary and you are free to decline participation without explanation or consequence. You may elect to withdraw your participation at any during the survey by simply exiting the survey. Any data you have provided up to that point will be deleted.
• There are no potential risks to you in participating in this study. Participants will have the option to withdraw without penalty or prejudice.
• All raw data collected on this survey is anonymous and will only be available to the principal investigator of this project (Kevin Dougherty).
• While data held by SurveyMonkey, an US based company, is open to access by American regulatory bodies through US laws and/or the Patriot Act, please note that all data will be downloaded and then deleted from SurveyMonkey after the data collection period. Additionally, the raw data collected from this survey will be encrypted and password protected on a hard drive stored at Durham College.

This study has been reviewed and accepted by the Research Ethics Board at the University of Ontario, Institute of Technology (UOIT) (file # 12-111) as well as the Research Ethics Board at Durham College using the Ontario Community College Multi-site application (file # 039-1213).

You may not benefit personally from this study; however, your participation may provide a future benefit by identifying positive factors that may help encourage adoption of digital technologies by college faculty with an aim to improve or support teaching and learning at your college. There is no cost to you to participate, other than the time you will spend completing the survey.

The information compiled from this study may be presented at professional conferences and/or submitted for peer review and publication in educational research journals. The information collected through this survey will be used as part of group data only. No individuals will be identified by name and all responses will be held in confidence. Through these safeguards, there is no risk to you in participating in this study. Furthermore, by consenting, participants have not waived any rights to legal recourse in the event of research-related harm.

If you have questions or concerns about your role as a research participant in this study please contact Ralph Hofmann Chair, Research Ethics Board Durham College by email using ralph.hofmann@durhamcollege.ca or by phone 905 721-2000 extension 7381.

If you have any questions or concerns about this study, or if you are interested in reading the results of the study after the study's completion in the winter of 2014, please email me using kevin.dougherty@durhamcollege.ca or call 905 721-2000, extension 2270. You may also contact my research supervisor at UOIT, Dr. François Desjardins by email using francois.desjardins@uoit.ca or by phone 905 721-8668 extension 2198.

Thank you for your assistance.

Kevin Dougherty
Master's Candidate in Education and Digital Technologies, UOIT, and
Professor, School of Business, IT and Management, Durham College.

Understanding Factors that Influence College Faculty in Deciding to Adopt

✳Consent to Anonymous Online Survey

Having read and understood this letter of information and consent, by indicating my willingness to take part below:

• I freely consent to participate in this research project.

• I have read this letter of information and had all questions answered to my satisfaction.

• I understand that my participation is voluntary and I am free to withdraw at any time without consequence.

• I understand that data I provide for the study will be analyzed and reported on in research presentations and publications.

• I understand that my identity will remain confidential.

• If I wish to end my participation in this survey, I simply have to click the "Exit Survey" button at the top of the screen. Any data from incomplete surveys will be deleted.

◯ I have read and understand the information in this consent form, and I am WILLING to participate in the survey.

◯ I have read and understand the information in this consent form, and I am NOT WILLING to participate in the survey.

Understanding Factors that Influence College Faculty in Deciding to Adopt

Part 1: General Information

Instructions: For each of the following, please select the option that best describes you and your teaching experience.

*What is your gender?

◯ Female   ◯ Male

*What is your age?

◯ Under 30   ◯ 30 to 39   ◯ 40 to 49   ◯ 50 or older

*Please indicate your years of experience teaching, in any capacity, at a Community College.

	Select Number of Years
Full-Time Community College	
Sessional Full-Time Community College	
Part-Time or Partial-Load Community College	

*Please indicate your number of years of work experience, outside of teaching at a Community College.

	Select Number of Years
Years of work experience outside of teaching	

*What program area(s) do you currently teach in, and/or have you taught in in the past. (Select all that apply).

	Currently Teaching in	Have taught in the past
Applied Arts	☐	☐
Business and Management Studies	☐	☐
Media and Communication Arts	☐	☐
Emergency Services	☐	☐
Fine Art and Design	☐	☐
General Arts and Sciences	☐	☐
Health Sciences	☐	☐
Human Services	☐	☐
Hospitality and Tourism	☐	☐
Information and Computing Technology	☐	☐
Justice Studies	☐	☐
Science and Technology	☐	☐
Skilled Trades and Apprenticeship	☐	☐

Understanding Factors that Influence College Faculty in Deciding to Adopt

Part 2: Experience and Level of Use of Digital Technologies in your Teachin...

Instructions: For each question, please select the option or options that best indicate your level of usage of digital technologies in your teaching practice.

*Approximately how often do you use each of the following tools to communicate with students in your class.

	Never	Once a Month or Less	A Few Times a Month to Once a Week	More Than Once a Week to Daily
Email	◯	◯	◯	◯
Instant or SMS Text Messaging (via mobile device or PC)	◯	◯	◯	◯
Discussion Board (LMS or other)	◯	◯	◯	◯
Video Conferencing (Skype, Adobe Connect, Collaborate, Google Hangout or other)	◯	◯	◯	◯
Facebook	◯	◯	◯	◯
LinkedIn	◯	◯	◯	◯
Twitter	◯	◯	◯	◯

Other digital or web communication tool, (please specify)

Understanding Factors that Influence College Faculty in Deciding to Adopt

*For each of the following, please indicate the tool, or tools, that you use to deliver learning materials to students in your class. (Check all that apply)

	Institutional LMS (ex. Blackboard, D2L, etc.)	Personal Course Web Page	Email	Wiki	Video Conferencing (Skype, Adobe Connect, Collaborate, Google Hangout or other)	Podcasts	Vodcasts (Screencast, YouTube or other)	Do not provide this type of learning material using digital technology
Course Outline	☐	☐	☐	☐	☐	☐	☐	☐
Lecture Notes	☐	☐	☐	☐	☐	☐	☐	☐
Demonstrations	☐	☐	☐	☐	☐	☐	☐	☐
Web Links	☐	☐	☐	☐	☐	☐	☐	☐
Example Problems/Solutions	☐	☐	☐	☐	☐	☐	☐	☐

Other course materials, and/or other digital technology (please specify)

[ ]

*For each of the following, please indicate the tool, or tools, that you use to assess students in your class. (Check all that apply)

	Institutional LMS (ex. Blackboard, D2L, etc.)	Personal Course Web Page	Email	Wiki	Video Conferencing (Skype or other)	Podcasts	Vodcasts	Do not provide this type of assessment using digital technology
Surveys, Quizzes or Tests	☐	☐	☐	☐	☐	☐	☐	☐
Assignments	☐	☐	☐	☐	☐	☐	☐	☐
Class Discussions	☐	☐	☐	☐	☐	☐	☐	☐
Group Work	☐	☐	☐	☐	☐	☐	☐	☐

Other assessment type, and/or other digital technology (please specify)

[ ]

Understanding Factors that Influence College Faculty in Deciding to Adopt

*For each of the following, please indicate the tool, or tools, that you use to provide feedback to students in your class. (Check all that apply)

	Institutional LMS (ex. Blackboard, D2L, etc.)	Personal Course Web Page	Email	Wiki	Video Conferencing (Skype or other)	Podcasts	Vodcasts	Do not provide this type of feedback using digital technology
Grades	☐	☐	☐	☐	☐	☐	☐	☐
Rubrics	☐	☐	☐	☐	☐	☐	☐	☐
Comments on Assignment Submissions	☐	☐	☐	☐	☐	☐	☐	☐
Peer/Self Evaluation	☐	☐	☐	☐	☐	☐	☐	☐

Other feedback, and/or other digital technology (please specify)

[text box]

*Please indicate your level of use of each of the following tools to manage grades for students in your class.

	Never Use	Have Used	Use Regularly
Institutional LMS Grade Book	○	○	○
Intranet Grade Book	○	○	○
Licensed Spreadsheet Software (MS Excel or other)	○	○	○
Web-Based Spreadsheet Software (Google Docs or other)	○	○	○

Other digital or web technology, (please specify)

[text box]

Understanding Factors that Influence College Faculty in Deciding to Adopt

Part 3: Personal and Institutional Views on the use of Digital Technologies...

Instructions: For each of the following statements, please select the option that best indicates your views, and your understanding of you college's views, on the usage of digital technologies in teaching and learning (DTTL).

The technologies to consider while answering this question will be different for each individual. For you, it may be an increased use of email, Skype or other communication tool, experimentation with use of social media such as Twitter or Facebook, the development of an online or hybrid course, your own use of a tablet in class, or an expanded use of your college's LMS.

＊Please indicate your level of agreement with each of the following statements regarding DTTL, in your own practice, in your classroom or outside of your classroom via the web or social media.

	Disagree	Slightly Disagree	Neutral or Not Applicable	Slightly Agree	Agree
As an instructor I believe the use of DTTL brings value to the classroom	○	○	○	○	○
My students believe the use of DTTL brings value to the classroom.	○	○	○	○	○
The use of DTTL improves the quality of the learning experience at my college.	○	○	○	○	○
The advantages of using DTTL outweigh any disadvantages.	○	○	○	○	○
Incorporating DTTL into my teaching practice is difficult.	○	○	○	○	○
I feel overburdened when I'm asked to incorporate the use of DTTL into my teaching practice.	○	○	○	○	○
My college believes it is important that I incorporate the use of DTTL into my teaching practice.	○	○	○	○	○
My college encourages me to integrate the use of DTTL into my teaching practice.	○	○	○	○	○
My college IT department provides the support I need to integrate the use of DTTL into my teaching practice.	○	○	○	○	○
My college has a teaching and learning resource center that provides adequate training to enable me to integrate the use of DTTL into my teaching practice.	○	○	○	○	○
My college supports me with release time and/or professional development to integrate the use of DTTL into my teaching practice.	○	○	○	○	○
When I decide to integrate the use of DTTL into my teaching practice I will have to seek out professional development outside of what my college makes available to me.	○	○	○	○	○

Understanding Factors that Influence College Faculty in Deciding to Adopt

✱ For the following statements, please continue to indicate your level of agreement with each regarding DTTL, in your own practice, in your classroom or outside of your classroom via the web or social media.
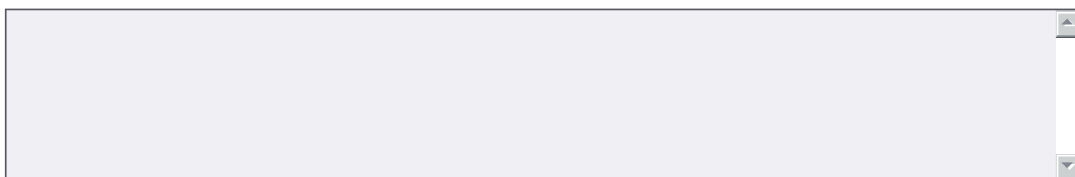
	Disagree	Slightly Disagree	Neutral or Not Applicable	Slightly Agree	Agree
Administration at my college is well informed on the use of DTTL in teaching and learning.	◯	◯	◯	◯	◯
The strategies being implemented at my college to increase the use of DTTL in teaching and learning are in line with my own professional needs and beliefs.	◯	◯	◯	◯	◯
My supervisor believes that I should further integrate the use of DTTL into my teaching practice.	◯	◯	◯	◯	◯
My peers believe that I should further integrate the use of DTTL into my teaching practice.	◯	◯	◯	◯	◯
My students believe that I should further integrate the use of DTTL into my teaching practice.	◯	◯	◯	◯	◯
I would recommend to my peers that they should consider further integration of the use of DTTL into their teaching practices.	◯	◯	◯	◯	◯
I have the knowledge required to integrate the use of DTTL into my teaching practice.	◯	◯	◯	◯	◯
I feel comfortable using DTTL.	◯	◯	◯	◯	◯
Integrating the use of DTTL into my teaching practice is completely within my control.	◯	◯	◯	◯	◯
I plan to increase the use of DTTL in my classroom.	◯	◯	◯	◯	◯
I plan to further integrate the use of DTTL into my teaching practice in the next semester.	◯	◯	◯	◯	◯
I plan to further integrate the use of DTTL into my teaching practice in the next academic year.	◯	◯	◯	◯	◯

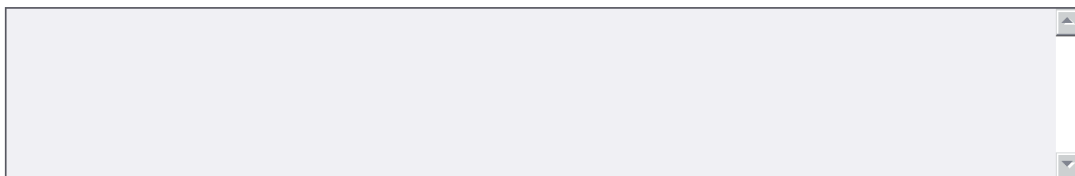# Understanding Factors that Influence College Faculty in Deciding to Adopt

Part 4: Personal and Institutional Factors that may Lead to Adoption

Instructions: Please take a few minutes to provide answers to each of the following questions in the corresponding text box.
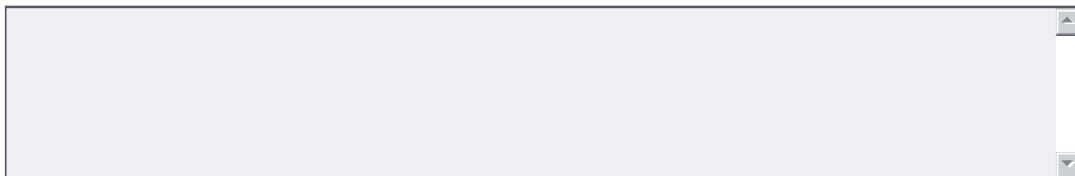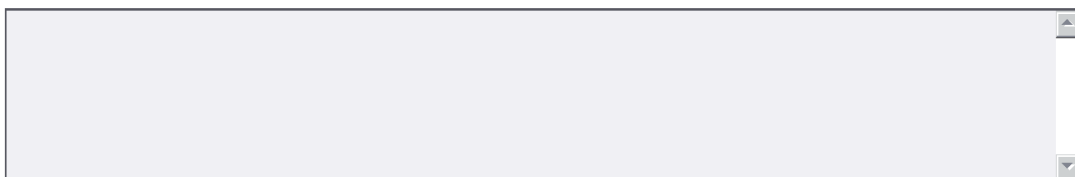
*Please describe two or more possible benefits, to you, of adopting a digital technology into your teaching practice.

*Please describe two or more possible benefits, to your students, of adopting a digital technology into your teaching practice.

*What can your Dean, or other college administrative leader do, to provide you with the incentive to adopt a digital technology into your teaching practice?

*What is the most important factor, or combination of factors, that influences, or could influence, your decision to adopt a digital technology into your teaching practice?

Understanding Factors that Influence College Faculty in Deciding to Adopt

Part 5: Voluntary Participation in a Follow-up Interview

I will be conducting short, 30-40 minute, recorded interviews in an effort to learn more about personal adoption of digital technologies, and personal motivators that led to, or may lead to, adoption of digital technologies in teaching and learning. These interviews will be conducted face-to-face during the months of May-June, or August-September, at a location convenient to you. If you elect to participate in an interview, please provide your contact information below. If you do choose to provide your contact information, you may or may not be contacted to arrange an interview.

The information you provide during the interview will be held in confidence, your name will never appear in any report or publication regarding this study. You are not required to participate in an interview; participation in the interview is completely voluntary.

✱Election to participate in a 30-40 minute interview

◯ No, I would not be interested in participating in a face-to-face interview regarding my personal adoption of digital technologies in my practice.

◯ Yes, I would be interested in participating in a face-to-face interview regarding my personal adoption of digital technologies in my practice.

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✱Contact Information for Face-to-Face Interview

Name:	
College Name:	
School or Faculty:	
Email:	
Phone:	

Thank you for taking the time to complete this survey. Your participation may provide a future benefit by identifying positive motivators that could help to encourage adoption of digital technologies by college faculty with an aim to improve or support teaching and learning at your college.

If you have any questions or concerns about this survey, or the study that it is supporting, or if you are interested in the results of the study, you can email me directly using kevin.dougherty@durhamcollege.ca or call 905 721-2000, extension 2270.

Appendix B

Interview Questions

1. How many years' experience have you had teaching?

2. What subjects do you teach?

3. How would you describe your personal level of use of digital technologies in your practice?

4. Can you tell me about any digital technologies you currently utilize in your teaching practice?

5. Please describe how do you see digital technology "fitting in" to teaching and learning or in support of teaching and learning?

6. Can you describe a digital technology that you have adopted in or adapted to in your teaching practice that you feel has added value to you or your students?

7. How do you perceive your level of use of digital technologies to that of your peers in your program group or school?

8. What, if any, pressures have you felt to adopt a specific, or mandated, digital technology into your practice?

9. Can you describe the role of your peer group (program team, school) in supporting or enabling your adoption of a digital technology in your practice? *(Refer back to question 8 for specifics if necessary).*

    a. *Complementary:* Please provide details of an instance of one or more of your faculty peers motivating you to adopt a digital technology into your teaching practice or to adopt a new method of teaching into your practice. Do you consider the adoption successful?

10. Can you describe the role of your Dean and college leaders in supporting or enabling your

adoption of a digital technology in your practice? *(Refer back to question 8 for specifics if necessary).*

    a. *Complementary:* Please provide details of an instance of your Dean or one or more college leaders motivating you to adopt a digital technology into your teaching practice or to adopt a new method of teaching into your practice. Do you consider the adoption successful?

11. Would you say that recognition of some sort, either by your peers, supervisor or college, is appropriate for successful adoption of a new digital technology into your practice, mandated or not mandated?

    a. *Complementary:* Can you describe the type of recognition you would feel appropriate for successful adoption of a new digital technology into your practice, mandated or not mandated?

12. Can you identify a digital technology that you would you like to adopt into your practice but do not feel you have the appropriate knowledge, support, time, or comfort level to adopt?

    a. *Complementary:* What personally is required for you to feel confident in adopting [that] digital technology into your practice?