Enhancing the Adoption of Educational Technologies In a Postsecondary Environment

by

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COMMITTEE APPROVAL

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Abstract

The organizational challenge of resistance to technology adoption quantified as low utilization, lack of enhanced outcomes, or even interpersonal or intergroup tension is commonly experienced. The purpose of this study is to examine the behaviour of technology adoption by professionals with the objective of identifying means by which to enhance technology adoption within postsecondary education institutions. Using a prominent adoption model as a foundation from which to base the inquiry, a qualitative meta-synthesis methodology was used to examine technology adoption through existing research. The dataset was iteratively drawn from the cumulative bodies of knowledge associated with the determinants of adoption behaviour. The results indicate that technology adoption is a process of dynamic change that requires constructive conflict resolutions. This study was specifically intended for the postsecondary educational environment, but the determinants of adoption behaviour appear to be generalized to professionals beyond postsecondary education.

Keywords: Technology acceptance model, Technology adoption, Postsecondary education, Technology introduction, Change

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Chapter One: Introduction

The pace of technological advancement in the first decade of the 21st century has been relentless. It is estimated that "the 21st century will be equivalent to 20,000 years of progress at today's rates" (Kurzweil & Meyer, 2003, para. 1). For example, the telephone took decades to reach 50% of households, but it took much less time for cellphones to reach the same level of usage. Automotive design cycles have moved from 60 months to 24-36 months is just five years (McGrath, 2013). The introduction and adoption of technologies over the last 50 years have experienced mixed success and have often resulted in much less benefit than predicted (Knutel, 1998; O'Neill, 2012; Siegel, 2008; Suhy, 2010; Venkatesh & Davis, 2000). With the invention of the microprocessor, the impact of computing on almost every aspect of life has been the significant driver of many technologies that are now considered common to daily life (Knutel, 1998).

Context

Narrowing the general view of technology advancement strictly to postsecondary education changes the context but does not diminish the relative magnitude of impact (Anderson, 2012; Knutel, 1998; Suhy, 2010; Venkatesh & Davis, 2000). The day-to-day reality, however, is regularly described quite differently. Postsecondary education is often portrayed in ways that indicate the advances of technology have been resisted (Christensen, Horn, & Johnson, 2008; Marshall, 2010; Knutel, 1998). In many cases, the extent of resistance has resulted in education today closely resembling education of the 19th century. This evaluation has, in part, fueled growing pressure for postsecondary to adopt educational technologies to an extent unseen in many institutions to date (Barak, 2012; Knutel, 1998).

The challenge of technology adoption is not unique to postsecondary education. The fact is that most technology introduction does not deliver its anticipated results. Information technology, as an example that crosses most segments of the economy, is forecast to exceed $3.8 trillion worldwide spending in 2015 (Gartner, 2015). However, while research indicates that 17% of large IT projects actually threaten the very existence of the company and nearly half of the projects deliver 56% less value than predicted (McKinsey & Company, 2012). Systems are purchased and implemented, but resistance to adoption is so significant the project is never completed. Many system implementations are identified as completed, but the end-user utilization of the system is minimal or superficial and, as such, the improvement anticipated is never realized.

Postsecondary education finds itself in similar circumstances. Significant amounts of money and resources are dedicated to the introduction of educational technologies, but ultimate adoption rates are poor (Anderson, 2012; Knutel, 1998; Marshall, 2010; Suhy, 2010; Venkatesh & Davis, 2000). The resulting issues are twofold: first, education continues to closely resemble the practice of fifty, seventy-five, or even hundreds of years ago. "The traditional, teacher-centered lectures and discussions found in most classrooms today date back several thousand years to the time of Plato and Socrates in ancient Greece" (Knutel, 1998, p. 8). Much of society and the majority of students currently in or approaching postsecondary education find this bewildering and unengaging (Wesch, 2007; Padilla-Meléndez, Aguila-Obra, & Garrido-Moreno, 2013). Second, the introduction of educational technologies not fully adopted contributes to an overall increase in costs for education. For many institutions, government is a major financial contributor to the

operation. Increasing costs at a time when many governments are actively decreasing the level of funding they are providing is not sustainable (Anderson, 2012).

Technology advances are not projected to slow; in fact, the pace of technological change is expected to increase. Exploring the opportunity to enhance the adoption of educational technologies in postsecondary education is vital. If postsecondary education is to remain financially viable and relevant to current and future students, the successful adoption of technology needs to become ubiquitous (ONeill, 2012).

Purpose

This study examines the behaviour of technology adoption by professionals within organizations with the intent to develop a theory-based modification to an existing technology adoption model. A variety of technology adoption models have been developed and are currently in use. Each model has the express purpose of describing and predicting the acceptance and usage behaviour of end-users. These existing models take a number of approaches in attempting to identify and understand the variables that will affect the adoption of particular technologies by the intended user. Each model also endeavours, in varying degrees, to align variables with pre-implementation or post-implementation interventions that can be undertaken with the intention to improve the acceptance of the technology within the specific situation. The issue is that despite the variety of models developed to explain the behaviour of individuals' technology adoption, all existing models are limited by their relatively low explanatory and predictive powers (Sun & Zhang, 2006).

Technology usage in the teaching practice of postsecondary education is not a new phenomenon. During the researcher's employ at a large postsecondary institution in the province of Alberta, numerous technologies have been investigated. The technologies have ranged from

software and devices such as tablets to network provisioning and full learning management systems. Some technologies were adopted into the teaching practices of individual faculty, fewer were integrated into specific programs, and fewer still were successfully implemented institute-wide. The experience has been that technologies adopted into programs or institute-wide were either accepted or resisted by individual faculty for various reasons not always easily anticipated. Technology introduction and subsequent adoption by the end-users for which it was intended are significant challenges that cut across geographic boundaries, economic sectors, and job levels. The resistance to adoption of technology is a widespread phenomenon, even among teaching professionals, and needs to be better understood (Davis, Bagozzi, & Warshaw, 1989).

Rationale

Technology usage within postsecondary education is not a new phenomenon, but the importance of technology adoption in teaching practice is becoming ever more critical. Increasingly, students entering advanced education are coming with an expectation of technology availability and usage within their learning experience (Padilla-Meléndez et al., 2013). In response to these expectations, institutions are implementing initiatives that require faculty to adopt educational technology into their courses at increasing levels (Anderson, 2012). This expectation of increasing usage of education technology in course instruction is directly impacting program faculty and staff work activities. This type of change is often met with resistance and easily results in conflict, reduced productivity, and diminished employee satisfaction (Venkatech & Bala, 2008). Given the actual costs of the technologies being introduced, the impact these initiatives can have on morale, and the rising importance of learning technology to prospective students, its effective introduction and subsequent adoption by the end-users for which it was intended is gaining significance for postsecondary leadership.

This study will synthesise the findings in published research studies, concentrating on an existing technology adoption model. When considering existing models, the technology acceptance model (TAM), developed by Fred Davis (Davis, 1989), has been the focus of a significant number of research projects. These efforts have resulted in extensive empirical support for TAM along with the identification of numerous determinants of the existing variables as well as additional modifiers for augmenting TAM. This study will focus on TAM as it has broad usage and is one of the most frequently cited and influential models of technology acceptance (Padilla-Meléndez et al., 2013). As of January 2015, *Google Scholar* listed over 33,600 citations for the two journal articles that introduced TAM: *Perceived usefulness, perceived ease of use, and user acceptance of information technology*, Davis, F. D. (1989), and *User acceptance of computer technology: A comparison of two theoretical models*, Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). Despite this extensive prior work, there is need for research that contributes to a "better understanding of the dynamics of the user technology acceptance phenomenon…in applying theoretical models to specific situations in organizations" (Sun & Zhang, 2006, p. 54). TAM is a valid and robust model but consistently explains only approximately 40% of the variance between individuals' intention to use a technology and their actual usage (Lee, Kozar, & Larson, 2003).

Significance

This research has implications for both application and further study. First, it seeks to develop a theoretical-based improvement of TAM. The introduction of technology into institutions is costly, and its adoption by the intended end-user is critical to its anticipated value. Postsecondary institutions need to see increased success in technology implementation. The costs of educational technology are increasing as are the associated risks of limited adoption.

Institutional leadership needs to be able to make informed decisions about interventions aimed at reducing resistance and enhancing adoption among faculty and staff. There is a need to better understand the phenomenon of technology adoption, and theory development is important to extending understanding. According to Denscombe (2009), when "the main driving force behind a piece of research is the desire to solve a practical problem or to improve procedures… particularly in the context of organizations and the work environment…the purpose is clearly applied research" (p. 12).

Secondly, the research creates opportunity for further study in evaluating the theorized model. Case studies, quasi-experimental non-equivalent control group studies, and other methods could be undertaken to evaluate the theory and the resulting model.

Research Questions

The goal of this research is to use a qualitative meta-synthesis methodology to develop a theoretically based modification to the technology acceptance model. The proposed modification will increase its explanatory and predictive power for educational technology adoption in postsecondary education with the desire to enhance final adoption.

There has been significant prior research focused on TAM. These studies have ranged from evaluation of the model to efforts of augmentation and the addition of variables not delineated in the original model. The augmentations have increased the complexity of the model. However, the results have yet to conclusively improve the predictive and explanatory power of the original. The strength of TAM is its parsimony in combination with its predictive power. The simplicity of the model makes it easy to apply to different situations. Its consistent level of explanation, though only 40% of usage variance, is as high as that of more complex models. Nevertheless, while parsimony is a key strength, it is also a key limitation. TAM is predictive,

but its generality does not provide the information necessary to understand acceptance behaviour or guide meaningful intervention identification for the purpose of enhancing adoption (Venkatesh, 2000).

The objective of this study is enhancement of technology adoption. The specific objective of this research drives the following key questions of investigation:

1. In studies using TAM or modified versions of TAM, what factors were identified as influencing the adoption of new technology by faculty within higher education?
2. What did end-users indicate were the most significant determinants to their acceptance and usage of the new technology?

Assumptions

The study assumed the existence of distinct influences that can enhance or inhibit the adoption of technology. It also assumed that these determinants could be distinguished within the results of existing research studies at a level of detail that would allow for the synthesis of distinct findings into useful themes and groupings.

Limitations

The foundational model identified in the design of this study was Davis (1989) technology acceptance model (TAM). As such, there was a conscious choice within this study to continue to connect back to that model as a means of staying within project scope. This meant that there was research judged to be beyond the identified scope and, as such, was not pursued. For example, TAM was based on the Fishbein & Ajzen (1975) work on behaviour; as such, this project did not explore other theories on behaviour. The field of motivational research was also

judged to be out of the scope of this study and was not pursued beyond that of Bandura (1977) (1982).

The proposed model resulting from this study has not been validated with primary research. The exact relations and interrelations for the various determinants are yet to be tested.

Operational Definitions

Technology adoption: The acceptance and integration of the respective technology into the regular activities of one's job.

Change: Something is not as it was, or the process of transitioning from one state to another.

Change management: The planned approach to change that recognizes there is a human aspect and that it is not a single event in time.

Conflict: The pursuit of incompatible goals by different individuals or groups (Ramsbotham, Woodhouse, Miall, 2011).

Constructive conflict resolution: A win-win orientation that frames conflict as a mutual problem to be resolved or solved through joint cooperative efforts (Deutsch, 2014).

Educational technology: The practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Richey, 2008).

Resistance: The outward expression, in word or deed, of a desire to keep things the same.

Technology: The application of scientific knowledge to practical purposes, often taking the form of process, equipment, computational devices, or software systems.

Organization of Study

This chapter presents the background and challenge of technology adoption within organizations. It provides a compelling argument for the focus of the study, sets parameters for

the questions of investigation, and provides operational definitions of terms used. Chapter Two reviews the relevant literature that helped the researcher better understand technology adoption with specific attention to the technology acceptance model. Chapter Three contains a description of the research method and design used for this study as well as a rationale for why the particular method was selected. Chapter Four presents the findings of the study, including the common themes and patterns identified through interpretational analysis. Chapter Five provides a summary of the study, revisits the original research questions, proposes a theoretical alteration to the technology acceptance model based on the findings, and makes recommendations for possible management practices for enhancing technology adoption. This final chapter also makes recommendations for future research.

Chapter Two: Literature Review

Technology introduction is critical to most organizations on an ever increasing frequency. The challenge is that many technologies introduced are never fully adopted; therefore, the anticipated results are not realized (Anderson, 2012; Knutel, 1998; Marshall, 2010; McKinsey & Company, 2012; Suhy, 2010; Venkatesh & Davis, 2000). To begin to understand this challenge within the framework and rationale of the current study, the literature review covers the primary topics of technology adoption; prominent models of adoption; and key interrelated aspects of change, resistance, and conflict.

Technology Adoption

For this study, technology adoption has been defined as "the acceptance and integration of the respective technology into the regular activities of one's job." The behaviour of technology adoption in any given situation is an amalgam of technological features, organizational elements, individual characteristics, and the interchanges between them (O'Neill,

2012). To examine the issues of technology adoption, researchers have approached the phenomenon utilizing various relevant frameworks and associated models. The dominant perspectives on what influences technology adoption generally fall into two categories (O'Neill, 2012). The first perspective takes a technology-focused position in which technology characteristics are the prime drivers of adoption decisions. TAM (Davis et al., 1989), TAM2 (Venkatesh & Davis, 2000), UTAUT (Venkatesh, Morris, Davis, & Davis, 2003) are prominent examples. These models generally investigate user acceptance as a behavioural intention building from Fishbein & Ajzen's (1975) theory of reasoned action (TRA) or Ajzen's (1998) theory of planned behaviour (TPB).

The second perspective takes a human-focused position in which social elements are the prime drivers of adoption decisions. Rogers' (1995) Diffusion of innovation (DI), Cameron & Quinn's (2011) competing values framework (CVF), Clark's (1998) commitment and necessary effort (CANE), Doolin & Lowe's (2002) actor-network theory, and Hall & Hord's (1987) concerns-based adoption model (CBAM) are prominent examples. These models generally investigate user acceptance utilizing a greater diversity of social-based theories than the technology-focused models but without the overall application success of TAM.

Both groups of scholars have produced and deployed models to aid conceptualization, understanding, and enhancement of technology adoption. The work of both groups has advanced the field of study and practice of technology introduction. However, experience continues to indicate the research of technology adoption is incomplete. Technology introduction continues to be fraught with adoption challenges. The acknowledged complexities and continuing challenges indicate that to satisfactorily address the issues facing today's organizations, there needs to be a blending of research streams (Doolin & Lowe, 2002; O'Neill, 2012; Venkatesh et al., 2003).

Prominent Models of Adoption

Diffusion of innovation. For many, diffusion of innovation is one of the most familiar of all adoption models. The familiarity is often not directly with Everett Rogers' *Diffusion of Innovations* (1995) but more likely to be through popular culture knowledge of concepts associated with tipping points of new ideas or fads. Diffusion theory is a comprehensive look at the basic characteristics of an innovation and the correlation to its adoption or lack thereof by a social group. "Rogers' research has dominated the field of diffusion theory" (Tsang-Kosma, 2010, p. 17). Rogers (1995) defined diffusion of innovations as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 11). He defined an innovation as "an idea, practice or object that is perceived as new to the individuals or unit of adoption" (p. 11). Rogers' original work began in the late 1950s when he conducted a meta-analysis of farming practices studies looking at adoption of innovations. He determined that adoption behaviour fit the normal distribution curve and that to represent adoption within a social group, the curve could be split into five categories that he labeled as innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Rogers also determined five attributes of an innovation, as perceived by members of the social group: relative advantage, compatibility, complexity, trialability, and observability. He predicted that innovations "perceived by individuals as having greater relative advantage compatibility, trialability, and observability and less complexity will be adopted more rapidly than other innovations" (p. 16).

Numerous technology introduction studies use Rogers' innovation diffusion theory. Many technologies have been introduced through the use of innovators and early adopters. The

experience, however, is that many of those technologies never reach full adoption (Anderson, 2012).

Concerns-based adoption model (CBAM). As the name suggests, CBAM approaches technology introduction and adoption from the view of the participants in the change process. Hall & Hord (1987) studied "the experiences of teachers and college professors as they adopted and implemented educational innovations" (p. 5). Through the course of their research, several important assertions became foundational to CBAM. Hall & Hord (1987) list more than seven of these parameters, but those significant to this project are: "change is a process, not an event; it is possible to anticipate much that will occur during a change process; to change something, someone has to change first" (p. 6). The key assertion of CBAM is by understanding concerns of an individual, a change facilitator can enhance innovation adoption.

CBAM is not an intently predictive model, but it is frequently used for facilitating technology introduction and adoption within educational settings (Straub, 2009). The model principally focuses on mandated change which is typically more common in primary education than in postsecondary.

Technology acceptance model (TAM). One of the earliest specific technology acceptance models, TAM was originally developed and published by Fred Davis. Davis' (1989) original work was founded on Fishbein & Ajzen's (1975) theory of reasoned action (TRA). The theory of reasoned action posits that behaviour is a function of behavioral intention, which, in turn, is a function of the attitude toward the behaviour and the subjective norm concerning the behavior where "beliefs are the fundamental building blocks in the structure" (Fishbein & Ajzen, 1975, p. 14).

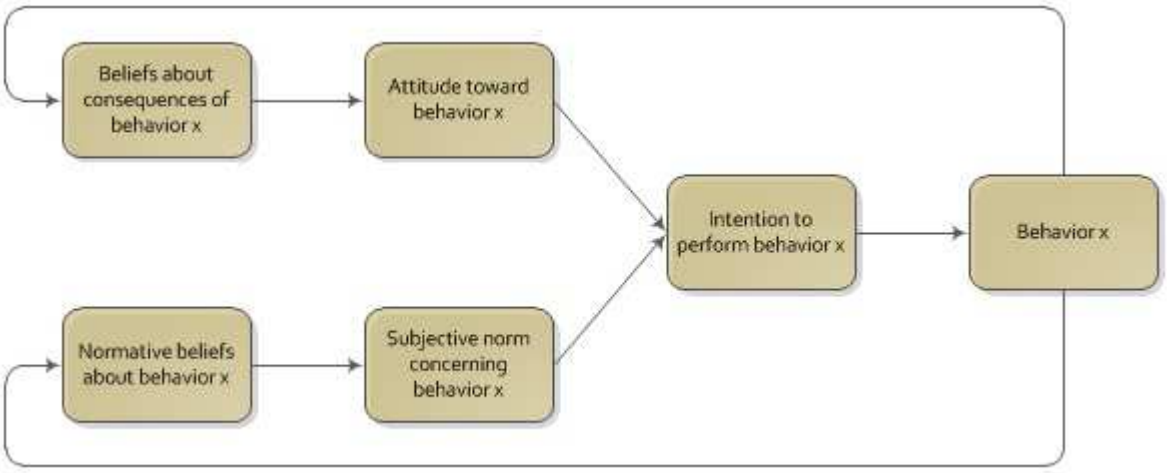

Figure 1. Theory of Reasoned Action (Fishbein & Ajzen, 1975)

TRA is widely studied and respected as model that proved useful in predicting and explaining individuals' behaviour in a wide variety of situations. As such, Davis deemed it would be "appropriate for studying the determinants of computer usage behavior" (Davis, Bagozzi, Warshaw, 1989). Using TRA as the theoretical basis of causal linkages, two specific technology beliefs were proposed: perceived usefulness and perceived ease of use.

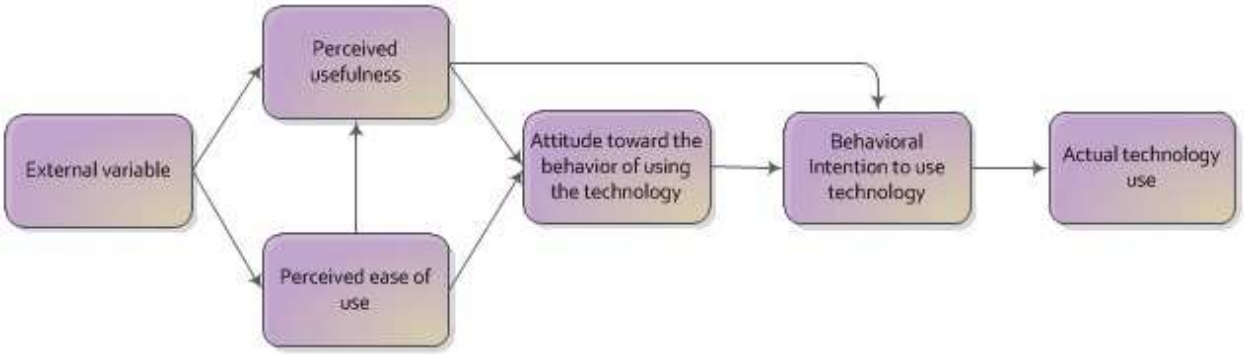

Figure 2. Technology Acceptance Model (Davis et al., 1989)

Perceived usefulness is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p. 985). Perceived ease of use is defined as "the degree to which the

prospective user expects the target system to be free of effort" (p. 985). Davis et al. (1989) acknowledged that there are many other possible influential factures but they are not determining factors in the final extent of adoption.

TAM's degree of explanatory and predictive capacity is better than most, despite not being as complex as that of later models (Venkatesh & Bala, 2008). TAM has been broadly employed and extensively researched. It has been applied in various contexts with different technologies using different control factors and dissimilar end-users. Yet it maintains consistency and validity (Lee, Kozar, & Larson, 2003). It is among the most influential models of technology acceptance (Padilla-Meléndez et al., 2013). A significant number of studies have used TAM to explore acceptance of technology within educational settings (Cheung & Vogel, 2013; Jan & Contreras, 2011; Padilla-Meléndez et al., 2013; Park, Lee, & Cheong, 2008).

Since TAM's original introduction by Davis, there have been efforts to build upon its strengths and increase its predictive and descriptive capacities. In the category of adoption models, TAM is certainly robust, but indications from research suggest it is insufficient for explaining all aspects of user intentions and adoption behaviour (Ngai, Poon, & Chan, 2007).

Technology acceptance model 2 (TAM2). Following TAM's introduction, many studies were undertaken to replicate and validate the work of Davis et al. (1989). As well, there were numerous efforts to expand on the work. Recognizing the implications within the findings that were being published, Davis collaborated with Viswanath Venkatesh in 2000 to revisit TAM. In the original model, social norm was identified as non-significant, but Davis et al. (1989) did acknowledge the need for additional research to "investigate the conditions and mechanisms governing the impact of social influences on usage behavior" (p. 999). Venkatesh and Davis (2000) proposed a theoretical extension to TAM that would incorporate aspects of social

influence. This more extensive model was referred to as TAM2. The actual testing of TAM2 incorporated a number of elements intended to address issues being raised by other researchers. The testing used longitudinal data collected on four different systems at four different organizations where two of the adoptions were optional and two were mandatory. Empirical tests of TAM had consistently confirmed perceived usefulness as "a strong determinant of usage intentions, with standardized regression coefficients typically around 0.6" (p. 187). Perceived ease of use had not proved as consistent. Holding to perceived usefulness as a confirmed driver of adoption intentions, Venkatesh and Davis (2000) expressed that a critical aspect of theoretically extending TAM was to understand the determinants of perceived usefulness and the impact on their influence over time as the user worked with the technology. "A better understanding of the determinants of perceived usefulness would enable us to design organizational interventions that would increase user acceptance and usage of new systems" (p. 187).

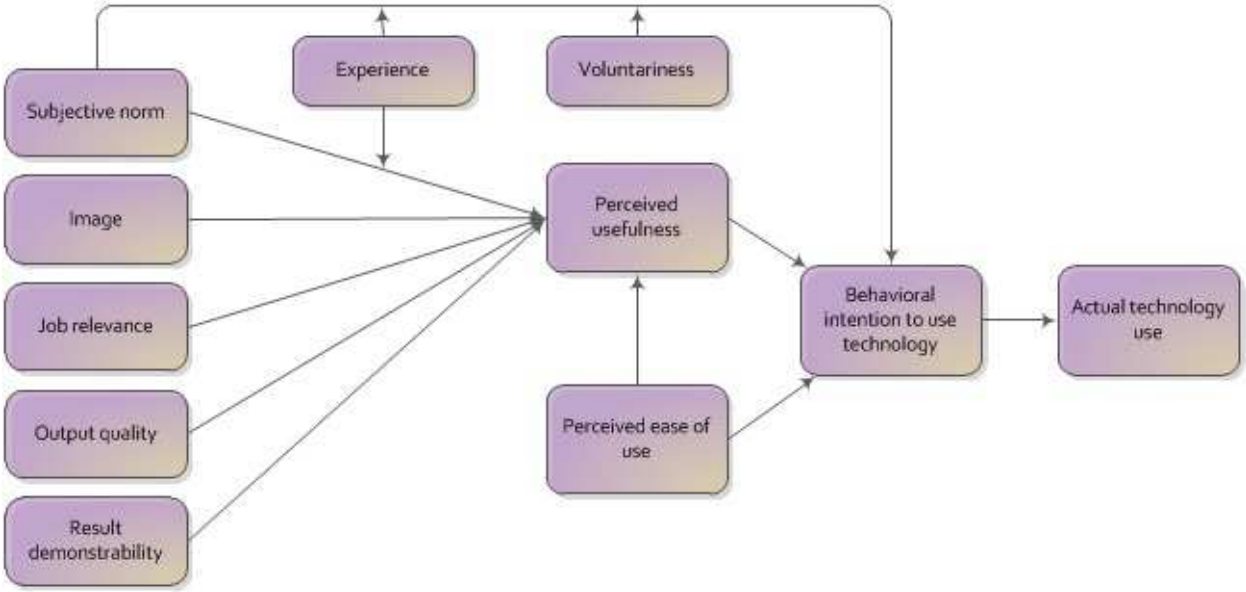

Figure 3. TAM2 (Venkatesh & Davis, 2000)

TAM2 returned consistent predictions of adoption across the four organizations and "explained up to 60% of the variance in perceived usefulness" (Venkatesh & Davis, 2000, p. 196). TAM2 successfully extended TAM and displayed that social influence determinants can exert direct effect on intentions to adopt technology. It also clearly identified the impact that mandatory versus voluntary adoption can play in adoption behaviour.

With the proven theoretical extension of TAM2 in place, Venkatesh (2000) undertook a similar identification of determinants for perceived ease of use. The work was not presented as a new model, but it did employ and test TAM with a set of specific determinants for perceived ease of use. Determinants of external and internal control were key elements included by Venkatesh. Control was not incorporated in Fishbein and Ajzen's TRA but does appear as a significant addition in Ajzen's (1991) theory of planned behavior (TPB).

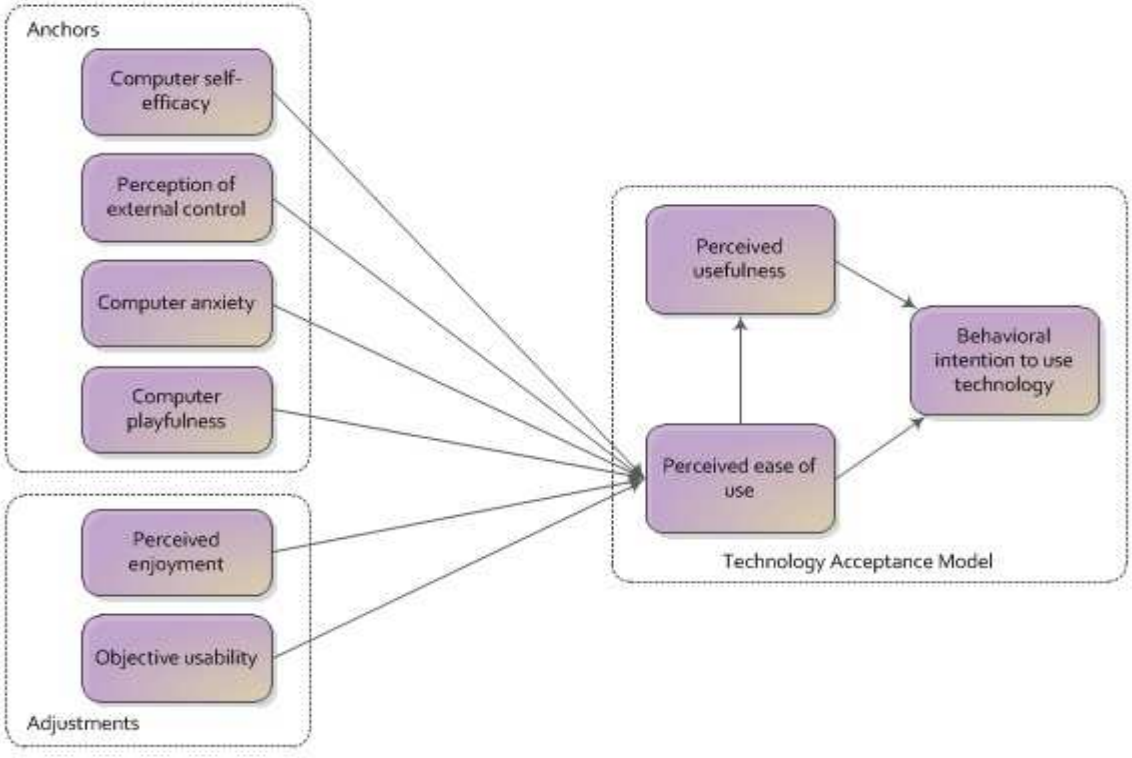

Figure 4. Determinants of Perceived Ease of Use (Venkatesh, 2000)

As with the TAM2 study, Venkatesh incorporated the aspect of actual behavioural experience into his testing. Previous studies had established the importance of actual time with the technology in the shaping and evolution of beliefs (Fishbien & Ajzen, 1975; Davis et al., 1989; Venkatesh & Davis, 2000). Venkatesh (2000) anticipated that this decision-making heuristic had disproportional impact on the prediction characteristics of ease of use as compared with perceived usefulness.

The research involved three longitudinal studies of voluntary system adoptions. The proposed enhancement "explained up to a total of 60% variance in perceived ease of use, thus doubling the current" (p. 342) capacity within TAM. The findings highlighted the importance of focusing on determinants to predict user acceptance while also indicating that determinants "are largely individual difference variables" (p. 357).

Unified theory of acceptance and use of technology (UTAUT). The model brings Vankatesh and Davis together again in a collaboration to review, compare, and evaluate eight competing models of technology acceptance with the intent to formulate and test a unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003). The work examines conceptual and empirical commonalities across the eight models, resulting in one major determinant construct from each model that was "significant in all time periods and also had the strongest influence" (p. 446). From these, the authors theorized four constructs that would "play a significant role as direct determinants of user acceptance and usage behavior" (p. 447). The authors also proposed four key moderators of the four determinants.

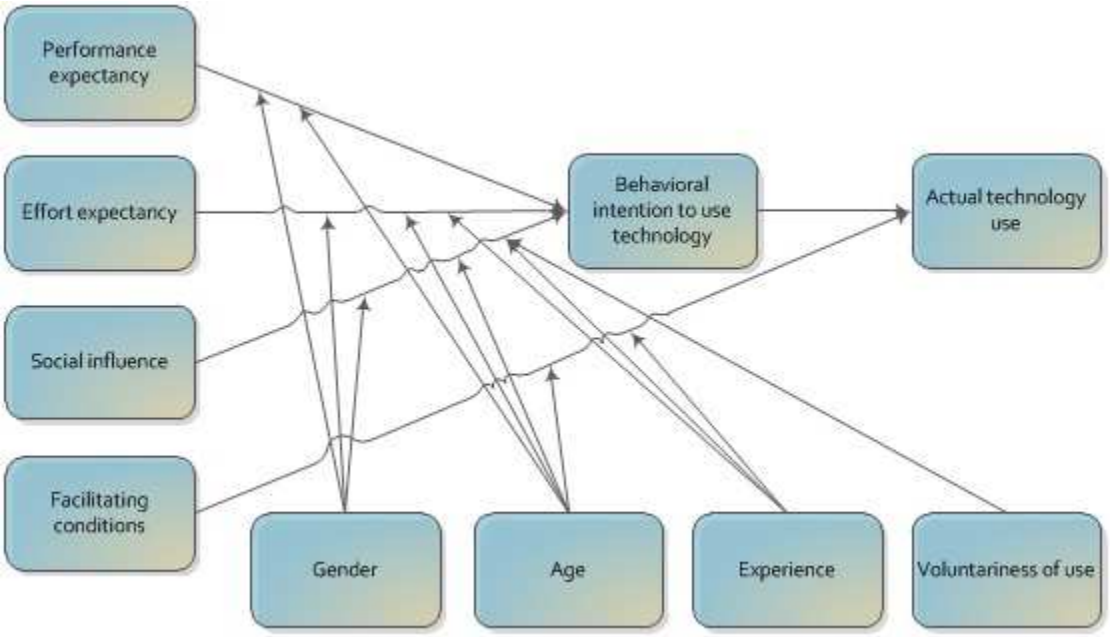

Figure 5. Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

The testing results showed strong empirical support for the model. UTAUT "accounted for 70 percent of the variance in usage intention; a substantial improvement" (Venkatesh et al., 2003, p. 467). The model focuses specifically on determinants and posits three with direct impact on intention to use and one with direct impact on usage behaviour. UTAUT's use of direct determinants correspondingly results in it being a useful tool for managers needing to assess the challenges to adoption faced by a technology introduction. The determinants enhance understanding of the drivers of acceptance, thus supporting proactively designed interventions targeted for users that may be less inclined to adoption of the new technology (Venkatesh et al., 2003).

Change

"To change something, someone has to change first" (Hall & Hord, 1987, p. 6) is a profoundly important practicality when considering technology introduction and adoption. It

speaks to the inexorable connection between the introduction of technology and the changes required for adoption to occur. The ultimate success of introducing a technology is contingent on whether individuals change to adopt the new technology (Hall & Hord, 1987). In the history of technology adoption models, the significance of the need for individual change was often minimized by the notion that change was a singular event or decision point. Change is neither an event nor a single decision; it is a process that often takes longer than planned and is much harder than expected (Kotter, 1996; Lapointe & Rivard, 2005; Sevier, 2003). The successful introduction of any technology will ultimately be measured as the level of adoption by the intended end-user. An individual's beliefs and attitudes towards a new technology can vary over time as they interact with the technology (Straub, 2009). A new technology can be embraced early in the adoption process and later begin to meet with resistance. Conversely, it can initially be met with resistance and later be embraced. Regardless of the timing, "resistance is a very normal phenomenon in the process of change" (Doopler, 2004, p. 126). Change is often met with resistance even when individuals are dissatisfied with the current state. Change is unlikely unless individuals "think the potential benefits of change are attractive and they really believe that a transformation is possible" (Kotter, 1996, p. 9). This need for internal and external capacity is reflective of Bandura's (1977) work on behavioural change. Bandura developed a theoretical framework that linked personal change with a concept called self-efficacy. Defined as "the conviction that one can successfully execute the behavior required to produce the outcome" (p. 193), an individual's perception of self-efficacy is based on previous performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. Davis et al. (1989) hypothesized that self-efficacy was an external variable of ease of use perceptions.

Resistance

Change, as has been articulated, is often met with resistance. Resistance is regularly identified as a significant technology adoption issue (Lapointe & Rivard, 2005). User resistance has even been described as "resulting from a mismatch between management goals and employee preferences" (Klaus, 2006, p. 17). Defined in this way, it sounds analogous to the definition of conflict, which will be dealt with in the next section. The introduction of a new technology often results in a change to what people do in their job or how they do their job and even the power they have in their job. Any one of these can cause resistance to occur. Lapointe & Rivard (2005) propose a dynamic vision of resistance to technology introduction and adoption. The vision starts at introduction where resistance may result, but only if the intended end-user group perceives threats to individual and/or group-level conditions. As the individual and/or the group adopts or resists the system, there will be consequences, which may or may not have been anticipated. Regardless, the consequences will change the initial perception of the technology, and the cycle will repeat. Resistance behaviours will subside or be ignited when "threats are perceived from the interaction between the object of resistance and initial conditions" (Lapointe & Rivard, 2005, p. 480). Clearly, this dynamic of user resistance can be complex. Klaus (2006) posits that despite the complexity, understanding and appropriately managing resistance is critical to enhancing technology adoption.

Resistance does not inevitably result in damage to an organization. There are valid reasons for intended users to both passively and actively resist technology implementations (Klaus, 2006). The key is that resistance must be appropriately addressed. In the introduction of technology, resistance cannot be regarded "as a wall that must be destroyed" (Maurer, 1997, p. 10). This view will lead to actions that attempt to defeat resistance; a response which will

typically cause resistance to intensify. Viewing resistance as something to be understood and endeavouring to identify important issues are appropriate responses that can actually help ensure the technology introduction can either be effectively implemented or modified to facilitate adoption. A manager's "inappropriate responses to resistance behaviors ultimately provoke resistance escalation" (Lapointe & Rivard, 2005, p. 484).

Conflict

The process of change is often met with resistance that can easily lead to conflict. "Conflicts are actually a completely normal and everyday part of human life" (Doopler, 2004, p. 127). This is noteworthy to technology introduction and adoption in that how these conflicts are resolved has a weighty influence on the success of the change (de Dreu & Gelfand, 2008; Gelfand, Leslie, Keller, & de Dreu, 2012; Marcus, 2014). Doopler (2004) actually suggests that conflicts are pre-programmed in change "because there are always some people who want to create something new, and others who want to preserve the status quo" (p. 127). For this study, conflict has been defined as "the pursuit of incompatible goals by different individuals or groups." Few situations are purely incompatible; most have a mixture of goals, and it is this reality that makes constructive conflict resolution possible. Reframing incompatible goals as mutual problems to be resolved helps develop a win-win orientation to resolving conflict "while a competitive or win-lose orientation hinders it" (Deutsch, 2014, p. 15). Marcus (2014) posits that not only is change a process, but that "the process of change is, at its core, one of conflict resolution" (p. 513). He suggests that change can be understood as "an outcome of a constructive or destructive conflict resolution process" (p. 513) that leads to a changed end state. The relevance of this to the current project manifests in the proposed immutable connection between technology adoption, change, and constructive conflict resolution.

Summary

Involvement in the introduction of technology within postsecondary can be perceived as extraordinarily challenging. Postsecondary is an environment in which there tends to be a large measure of professional autonomy, and many educational technologies are not introduced as mandated adoption. This literature review reveals that the challenge of technology introduction is not exclusive to postsecondary but broadly experienced across all sectors of the economy.

Published literature, unfortunately, is dominated with perspectives that generally fall into two categories (O'Neill, 2012). The first focuses on the characteristics of the technology. TAM (Davis et al., 1989), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh et al., 2003), and UTATU (Venkatesh, Morris, Davis, & Davis, 2003) being prominent examples. The evolution of research involving these and other examples clearly demonstrates the importance in identification of specific determinants to behavioural intention. The predictive power and usability for identification of interventions in this group of adoption models was notably enhanced with the utilization of these explicit determinants.

The second category focuses on the social elements of the situation or context. Rogers' (1995) diffusion of innovation is likely the most recognizable of these models, but many others including Hall and Hord's (1987) concerns-based adoption model (CBAM) are important examples. In understanding human behaviour, social elements play a key role whether individually or collectively as a group. Researchers like Fishbein and Ajzen (1975), Ajzen (1991), and Bandura (1977) (1982) establish the importance social aspects can impose on adoption behaviour. Aligned with this vein of inquiry is the inextricable link between technology adoption and the dynamics of change, resistance to change, and conflict. The process of technology introduction and adoption is the intertwining of people, processes, and technology

with the complexity that, in the end, the author finds analogous to teaching. An individual can no more be forced to truly adopt a technology than a student can be forced to learn.

Within both dominant perspectives represented in current research is a growing acknowledgment of the complexity inherent in technology adoption. The research of technology introduction and adoption is reasonably mature, but the continuing challenges to adoption that are experienced clearly manifest the need to blend other research streams in endeavouring to enhance end-user adoption (Doolin & Lowe, 2002; O'Neill, 2012; Venkatesh et al., 2003).

Chapter Three: Research Method

The focus of this study is exploring the possibility that adoption of technology by professionals can be enhanced. Limited technology adoption impacts a significant portion of postsecondary institutions and has the potential to have increasing impact (Anderson, 2012). The importance of technology adoption across all sectors of the economy has resulted in researchers undertaking numerous studies on technology introduction and adoption. Many of these studies utilize the technology acceptance model or a variant thereof. This extensive research has been recognized as a valuable data source and used by researchers in numerous quantitative meta-analysis studies (Jasperson et al., 2002; King & He, 2006; Lee, Kozar, & Larson, 2003; Legris, Ingham, & Collerette, 2003).

This study exploits the valuable data source of existing research using a qualitative synthesis methodology. Synthesis is a procedure that supports the identification of conceptual links previously unconnected (Weed, 2008). This project will specifically use qualitative synthesis in an effort to identify significant extensions or modifications to the technology acceptance model which may have been indiscernible or inaccessible to quantitative research. The study attempts to synthesize those changes to the model that resulted in improved prediction

and actionable capability as measured in identifiable increases in the adoption of the technology under study.

Study Design

This study examines the findings and interpretations of technology acceptance studies through the inductive qualitative meta-synthesis called Meta-interpretation (MI).

Barnett-Page and Thomas (2009) reference MI as:

> An ideographic rather than pre-determined approach to the development of exclusion criteria; a focus on meaning in context; interpretations as raw data for synthesis; an iterative approach to theoretical sampling of studies for synthesis; a transparent audit trail demonstrating the trustworthiness of the synthesis. (p. 10)

Weed (2005) proposes MI as a method "which focuses on the interpretive synthesis of qualitative research while maintaining an interpretive epistemology" (p. 1). Meta-interpretation has characteristics similar to grounded theory (GT). MI "aims to move from substantive theories, grounded in particular research contexts, to a more generic formal theory with a broader application" (p. 8). Following the lead of GT, MI makes use of iterative sampling and constant comparison as a means of responding to the tension between synthesis and effective sample size. MI cycles through iterations to a "theory that is derived from data systematically gathered and analysed through the research process" (Sheppard, 2004, p. 179).

Employing the MI methodology, the current study systematically analyzes the secondary data of existing research studies, theoretically sampling for relevant data to the phenomenon of technology adoption. The aspiration is not comprehensive coverage but an approach similar to grounded theory (Glasier & Strauss, 1999), which selects studies to be synthesized based on issues emerging from analysis (Weed, 2005).

Sample Data

By using existing published findings and reports involving technology adoption by professionals such as postsecondary education faculty, the study is able to undertake a much larger scale study than had it focused on primary data gathering. There are 26 publicly-funded postsecondary institutions in the Province of Alberta. The researcher has had considerable contact with many of these institutions' educational technology departments. This experience would suggest very few of them have utilized a technology adoption model in their introduction of educational technologies. Published studies and reports allow the current research to expand well beyond Alberta, removing geographic and temporal limitations and constraints.

The data sources included in the study were identified using Royal Roads University Library Summon search tool. Summon is a Google-like search tool that provides quick searching of credible library content in all formats. This search was supplemented with Google Scholar when desired data sources were inaccessible through Summon. The search was not limited to specific journals known to focus on technology adoption or educational technology. The intent of this choice was to not inadvertently predetermine the discipline streams that might provide insight to the inquiry at hand.

The initial selection of five studies, intended to be a sample with maximum variation and used to lunch the MI process, was identified with Summon. Using "technology acceptance model and educational technology and technology adoption and faculty" as keywords and specifying "Scholarly & Peer-Review" and content type of "Any –Book/eBook, Dissertation/Thesis, Journal Article" as the document type, Summon returned a listing of 256 items. Summon searches using other keyword combinations of "technology acceptance model," "educational technology," "technology adoption," "faculty," "technology introduction," and "introduction of educational

technology" were cross-referenced against the 256-item search. All relevant works from these additional searches were found to be represented within the 256-item search.

Data Collection

Weed (2008) identifies seven fundamental features that underpin the meta-interpretation procedure:

- the role of the synthesiser as an active interpretive agent;
- a recognition that the synthesis will be ‘an interpretation’ rather than ‘the interpretation’ of the collection of studies;
- an ideographic (rather than pre-determined) approach to the development of exclusion criteria;
- an iterative approach to the theoretical sampling of studies for synthesis;
- a focus on ‘meaning in context’;
- interpretations as the ‘raw data’ for synthesis; and
- a transparent audit trail as a guarantor of the integrity and trustworthiness of the synthesis (p. 23).

Guided by the fundamental features and Weed’s meta-interpretation procedure, data collection did not start with a specific proposition. Rather, it started with general guiding questions about (a) the behaviour of technology adoption by postsecondary faculty, (b) the objective of an improved prediction and actionable capability derivative of TAM, and (c) the researcher’s general awareness of the field. The result was the initial Summon search collection of 256 works.

The abstracts of the 256 works were reviewed with the intent to broadly increase understanding of technology adoption and determination of the initial five works to be used in the initiation of the synthesis. With the aim of maximum variation within the sample, balanced with the desired constraints of professionals' technology adoption and the focus on TAM, the result was the following sample:

- O'Neill, D. E. (2012). *How organizational culture as perceived by senior administrators influences the adoption of information technology systems in two 4-year public universities*;
- Park, B. (2003). *Faculty adoption and utilization of web-assisted instruction (WAI) in higher education: Structural equation modeling (SEM)*;
- Siegel, D. M. (2008). *Accepting technology and overcoming resistance to change using the motivation and acceptance model*;
- Suhy, A. M. (2010). *An examination of the relationships between organizational factors and information technology satisfaction and use: A study of undergraduate faculty*; and
- Tsang-Kosma, W. W. (2010). *University staff perspectives on change management strategies in student information system adoption*.

With the initial sample identified, a "concurrent thematic and context analysis of the studies in question" (Weed, 2008, p. 24) was undertaken. The analysis involved coding concepts and key ideas that emerged from the dataset and were interpreted to have potential relevance to enhancing levels of adoption. Analysis was followed by a consideration of the need to exclude any of the initial studies from the sample. As described earlier, there were no pre-existing criteria

for exclusion only the aim for maximum variation balanced with the constraint of professionals' technology adoption all coupled with the use of TAM in some form.

The refinement of the Summon search to the initial sample of five works was deemed successful. The works varied in their perspective and usage of TAM. Two contrasted with TAM, two extended TAM, and one utilized TAM variables as one of several contributing model variables. The works held to the foundation of professionals' adoption in a postsecondary environment, but the range of perspectives and variation of situations relating to the purpose of this study was broad. Analysis of the works also showed credibility and reliability. The works were assessed as accurately reflecting reality and representing their data honestly. With the selection and analysis of the initial sample complete, the exclusion criteria were documented, and the iterative process of theoretical sampling and analysis was initiated.

The inquiry focused on the concepts and key ideas that emerged from analyzing the initial dataset and which were interpreted as warranting further investigation. The choice of works was made on the grounds of the emergent concepts and ideas without specific resolve to being representative (Weed, 2008). The inquiry concentrated on increasing "the breadth and depth of the sample of studies being synthesised," while concurrently intending to "refine ideas not simply increase the size of the original sample" (p. 19). Weed emphasizes that "this iterative approach to theoretical sampling is at the heart of meta-interpretation" (p. 19). The method allows works to be included according to the emerging concepts and ideas of the synthesis; at the same time, it allows "an ideographic approach to the exclusion of studies" (p. 19). The result is "an iterative spiral of sample – analysis – exclusion until theoretical saturation is reached" (p.19).

As it is impossible to reach theoretical saturation in the first iteration, the works identified in the second inquiry were included into the dataset and underwent further thematic and context

analysis. As part of each MI iteration, the consideration of exclusions was undertaken and the criteria adjusted as necessary and applied to the successive iteration. In total, three iterations involving a total of 51 secondary works were carried out. Each iteration incorporated the emergent issues and correspondingly sought inclusion of negative or alternative points of view to challenge and test the emergent analyses. The iterative spiral continued until theoretical sampling ceased to add further insights to the analysis. At this point, theoretical saturation was assumed to have been achieved, and the final synthesis was started (Weed, 2008).

Data Analysis

Data collection was initiated without predetermined hypotheses to test, and data analysis continued in this inductive style with the researcher as "interpretive agent" (Weed, 2008, p. 17). Analysis started with the initial sample dataset. Specific attention was focused on the critical ideas emerging from the interpretations presented in each of the initial five works. With MI, the interpretations presented in the secondary works are the raw data for synthesis (Weed, 2008). With some synthesis methods, the type of data needed is not always present in published works. Using interpretations as raw data ensures ready availability while substantively supporting the focus on meaning in context. Weed identifies that analyzing secondary data can be problematic. There is the risk that the re-analysis can be undertaken with an understanding of the data that differs from that of the original collector. The consequence of this is that meaning in context is lost. To this point, the outcome of using the original researcher's interpretations is that the meaning in context is retained. "Interpretations can convey meaning in context, whereas raw data cannot" (p. 20).

The initial dataset was selected from the group of 256 works identified through Summon. With the aim of maximum variation, it was determined that to maintain the scope of the study, it

was important that the works were connected to TAM by using the model, modifying the model, or by critically reviewing or contrasting the model. Works that passed these criteria were than contrasted as to variation and contrast to one another, within the context of faculty within a postsecondary environment. The broadest variation representatives as to theories or methodologies used within the group were selected as the initial five data elements. The subsequent selection of the secondary data sources continued to consider the connection to TAM or its variables. Works on associated concepts, such as motivation, were included, but exploration of the broader concept was limited to the contextual scope of this project. The publication dates were also considered in data selection. More recent works were favoured to older works. Technology has changed significantly from 1995 to 2015. The earlier studies often were not reflective of the current nature of technology adoption behaviour determinants. Elements such as system stability or lack of previous experience with a computer were judged to have disproportionately impacted the conclusions of the researchers. This specific framing was judged to be important as it also had grounding in published criticisms of existing TAM studies (Lee et al., 2003).

Analysis of the sample dataset, assembled with the initial five works, was followed by the development of the initial exclusion criteria of:

- document type = peer-reviewed or published leader in the field;
- organization studied = postsecondary;
- study subjects = faculty and/or staff, but not students;
- topic of study = introduction and/or adoption of technology or the related ideas and issues;

- technology studied = not to be restrictive but to ensure depth and breadth; and
- model used = TAM, variant, or contrast.

After analysis, the constraints initially identified as relevant to the scope of the study remained virtually unchanged. There was some indication that professionals' adoption of technology, whether they are faculty or another profession, could have relevant similarity. This opportunity for inclusion of additional studies was cautiously explored in the next iteration. In addition to these initial exclusion criteria, the ideas and issues that emerged warranting further investigation were:

- professionals have a belief about what their job should be;
- subjective norm variables can be predictive;
- resistance impacts adoption;
- what is the relationship between resistance and motivation;
- characteristics of resistance;
- perceived lack of time, time to learn, time to develop;
- leadership support for adoption;
- usage of technology increases satisfaction and usage;
- what is the relationship of satisfaction and adoption;
- how/why do organizational culture and/or characteristics influence adoption;
- Change management and adoption;
- power dynamics of organizations and the impact on technology adoption;
- accessible support; and
- determinants of variables seem to drive the validity of a variable.

With the exclusion criteria in place and ideas and issues to investigate identified, the second iteration of theoretical sampling commenced. The intent of theoretical sampling is to deepen and broaden the sample dataset while concurrently refining ideas with the result that issues arising from analysis drive the search for other works. Each iteration enhanced the sample dataset as new works augmented and refined the synthesis. During the second iteration, 25 works were identified for thematic and contextual analysis, details of which are provided in the next chapter. Following each analysis, works were selected for inclusion in the dataset with the researcher working intensively with the interpretations in context to synthesize and code them accurately. As the synthesis developed, evolving codes were catalogued and subsequently reviewed for emergence of themes. Themes were recurring ideas within the interpretations or, more often, recurring meanings within variables used to predict or enhance technology adoption within the respective study. As the current inquiry progressed, important themes began to emerge. Interpretations were coded within their context in an effort to maintain meaning.

The synthesis process of MI is one of analysis and interpretation of interpretations. Weed (2008) is clear that meta-interpretation's synthesis process, like the meta-analysis process of calculating results using previously calculated results, involves interpreting interpretations when the meta-interpretations of the synthesizer are drawn from those of the original researcher. Both have a potential for loss of meaning, which is the peril of synthesis, but both can identify and undertake measures to ensure integrity is maintained. To provide this necessary assurance of integrity, the project recorded interpretations as direct quotes from the respective works. These direct quotes were placed into the analysis table as well as the coding document to ensure detail was carried forward through the synthesis process. Figure 6 is an example of the coding tree utilized in this project. In the example, the author of the work and the interpretation are

represented within a category of application, which, in the example, comprises technology-centric factors along with the synthesizer's interpretation and coding.

In the current study, the synthesis process continued through four iterations and five analyses before reaching a state of "theoretical saturation where no new insights emerged from the analysis" (Weed, 2008, p. 25). The analysis and final set of themes are presented in the chapter on results. The summary tables were constructed with the direct quotes from the text to support the interpretation and theming while also providing the necessary audit trail. Ultimately, the study results in the emergent theoretical insights being used to suggest a modification to TAM.

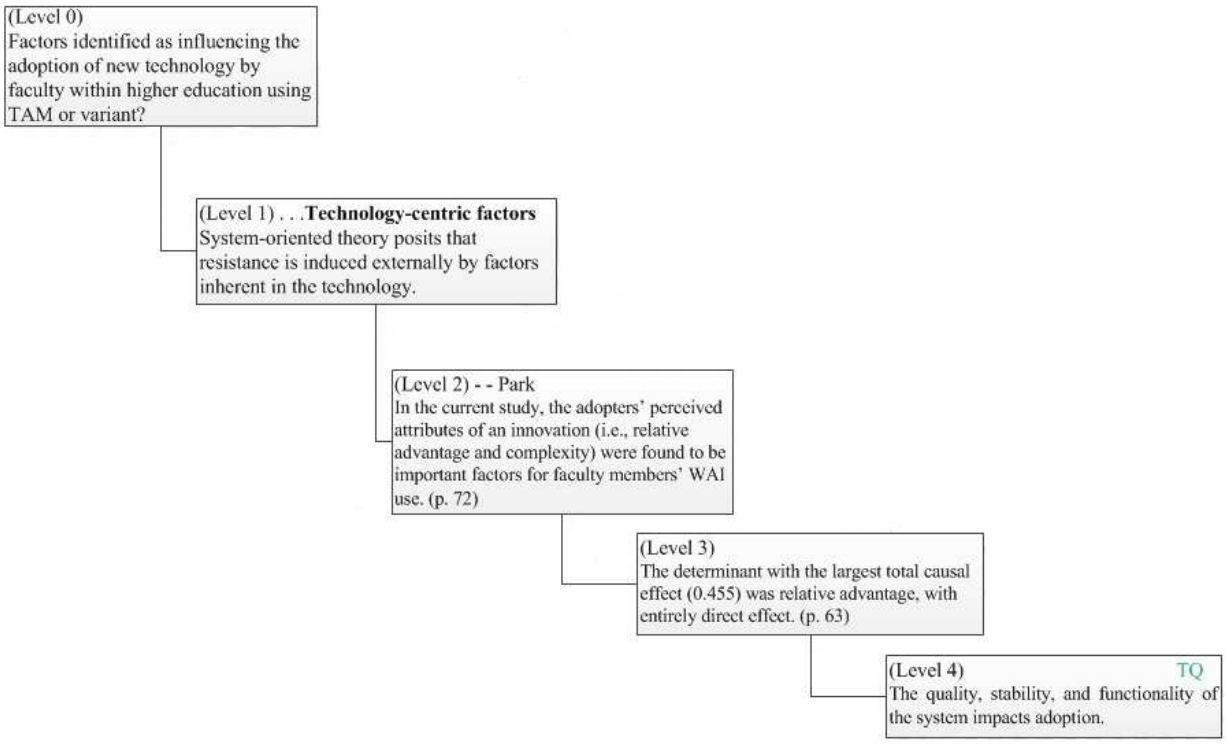

Figure 6. Example of the coding tree

This project kept to a number of foundational foci throughout the MI process. There was, however, a realignment of the final outcome to key theoretical insights that emerged from the

synthesis. It became clear that determinants of variables and not the variables themselves were the key to accurate prediction and appropriate intervention within the scope of technology acceptance models. Technology has changed significantly since TAM was first developed. The focus on qualities of the technology itself, though still important, does not hold the same significance when educational technology is bought and implemented versus built and implemented. Technology adoption models were initially created from the point of reference of a system developer needing information on how to build a better system. Today, very few educational technologies are custom developed, resulting in a profound shift from the point of action being with the developer to its residing with leadership and change management.

Ethics

The credibility of qualitative research rests with the work's dependability, confirmability, and the ethical foundation upon which it was conducted. The integrity of the researcher along with the rigorous application of research methods is vital (Patton, 1990). As the researcher, I have over 12 years' experience in higher education as a faculty trainer, educational technology department manager, and now program review quality assurance director. I have experience with technology introductions along with participation in and leadership of other educational innovation initiatives from which to draw for this study. I neither promote technology for its own sake nor believe it is always the solution to any problem. I am pragmatic about change. I do not support change for the sake of change but believe that change can be necessary and/or advantageous at certain junctures. I recognize that this background, while lending credibility to the study, could also increase the risk of researcher bias. During the initiation of this study, a thoughtful and reflective approach was taken to the design of the study and selection of a methodology that provided for triangulation through a broad source of data. While executing the

study, I have engaged in regular self-reflection and striven to remain neutral and report what has emerged from the data in a nonbiased way. The use of secondary data limited the concerns of security, privacy, and influence of others. As such, ethics approval was deemed not necessary for this study.

Chapter Four: Results

The purpose of this project was to identify the factors that influence the adoption of technology. The identified factors were then used in the development of a modification to TAM that would increase its explanatory and predictive power. The outcome of this process was to recommend a means for enhancing technology adoption by postsecondary faculty. This chapter presents the results of the research in a manner consistent with the methodology selected, documenting the iterative process of analysis and interpretation that was undertaken.

Iteration One

The actual interpretation data are represented in the analysis tables. The data are organized into the iterations in which they were first considered for inclusion into the sample dataset. Table 1.1 represents the theoretical sampling of the five works identified with the intent of maximum variation from the initial Summon search collection of 256 works.

Table 1.1

Overview Information of First Iteration Dataset

Authors	Date	Participants	Organization	Model /Focus
O'Neill	2012	Faculty/staff	Postsecondary institution	Competing values framework (CVF) contrasted to the absence of social elements in TAM.
Park	2003	Faculty	Postsecondary institution	Variables derived from Diffusion of Innovations (DI) and other models such as TAM.
Siegel	2008	Faculty	Postsecondary	Motivation and Acceptance Model. A

			institution	fusion of commitment and necessary effort (CANE) model and TAM.
Suhy	2010	Faculty	Postsecondary institution	An examination of relationships between organizational factors and faculty satisfaction with information technology and use.
Tsang-Kosma	2010	Academic Staff	Postsecondary institution	A framework of DI, Concerns-Based Adoption Model (CBAM), and TAM.

Table 1.2 contains the direct interpretation data and the coding assigned in the initial iteration. As the synthesis progressed, the maturation and refining of emerging key concepts and issues resulted in changes in the coding that are represented in later tables. Two representative letters were used in coding to ease changes when required and, more practically, to facilitate easy representation of the respective concepts, ideas, and issues without diminishing their associated complexity. Table 1.3 represents the emerging themes and their respective coding from iteration one.

Table 1.2

Interpretations and Coding of First Iteration Dataset

Work	Interpretation	Coding
O'Neill (2012)	"Universities are made up of multiple organizational cultures. Knowing and understanding how organizational culture and associated organizational characteristics influence central IT systems adoption might give university leadership an ability to affect central IT technology adoption, reduce costs associated with failed systems, and better position scarce university resources" (p. 212).	CI LS
Park (2003)	"In the current study, the adopters' perceived attributes of an innovation (i.e., relative advantage and complexity) were found to be important factors for faculty members' WAI use" (p. 72).	TQ
Park (2003)	"The results about the environmental factors (subjective norm, supports, and time) for WAI utilization in the current study should require more attention from instructional designers or change agents" (p. 72).	LS

Siegel (2008)	"According to the research, the statistically significant predictors for all of the usage variables were perceived usefulness and attitude toward LiveText" (p. 76).	BP TQ UR
Suhy (2010)	"There is an association between faculty satisfaction with equipment and faculty satisfaction with technology and faculty technology use" (p. 226).	TQ
Suhy (2010)	"Davis (1989) pointed out that two major factors in information technology acceptance were ease of use and perceived usefulness of the technology. This study suggests that satisfaction is also a key element" (p. 232).	BP
Tsang-Kosma (2010)	"In addition to accessible functional support, leadership support at different levels emerged as a crucial factor toward the success of the SIS implementation" (p. 282).	EA LS
Tsang-Kosma (2010)	"It is inevitable for innovations adoption to involve unwanted change; therefore, it is necessary for organizations to plan for it" (p. 286).	LS

Table 1.3

Interpretational Themes Emerging from the Dataset

Code	Theme
BP	Individuals' beliefs about their job and what it should entail can result in resistance or adoption of a technology.
CI	Transparent communication of information about a technology implementation together with the opportunity to provide feedback will support adoption of technology.
DE	Direct experience with the technology results in a truer perception than indirect or short introductions to the technology.
EA	Easy access to functional support and technical support encourages continued adoption of a technology.
EU	How easy or complex a technology is to use will impact adoption through altering the perception of relative value to the individual.
LS	Leadership's support of the technology in word and deed, and provision of time and/or money is important for adoption to occur.
MA	Mandatory adoption scenarios achieve higher levels of adoption, and it seems the usage of the technology helps people move beyond initial reluctance.
SE	Comfort with technology or perceived self-efficacy with a specific technology appears to be related, and both are effected by time spent using the technology.
TQ	Poor technology quality as experienced in lack of stability and/or speed, or lack of functionality, will cause resistance to usage.
UR	Usefulness to the user or relative value to the user of a technology is the key predictor of adoption behaviour.

Data analysis and identification of interpretations, questions, ideas, and concepts that warranted further investigation were recorded and used to direct the theoretical sampling for iteration two. Table 1.4 contains the questions, ideas, and concepts from iteration one.

Table 1.4

Items Warranting Investigation from First Iteration Dataset

Work	Questions, ideas, and concepts warranting further investigation
O'Neill (2012)	• Organizational culture and TAM • Organizational culture and/or characteristics • Is power an organizational culture and/or characteristic?
Park (2003)	• Subjective norm can be predictive? • Perceived lack of time, or time to learn, or time to develop • Determinants' importance to understanding the respective variable
Siegel (2008)	• Resistance impacts adoption • The relationship between resistance and motivation • The expressions of resistance
Suhy (2010)	• Usage increases usage • Resistance and workload • Satisfaction and adoption
Tsang-Kosma (2010)	• Change management and adoption • Initial training and accessible support • Leadership support

The initial sample dataset was selected from the Summon search result of 256. The data were selected as samples with maximum variation that was most representative of the research intent. The works covered the spectrum of the topic and utilized TAM in various ways. Three of the five works kept with faculty as the specific focus of study: Park, 2003; Siegel, 2008; Suhy, 2010. Two of the five went beyond the initial criteria to include staff of the postsecondary institution O'Neill, 2012, and Tsang-Kosma, 2010. The analysis of these works did not reveal any reason to exclude them from the initial group or to set staff verses faculty as a needed exclusion criterion. Faculty will have pedagogical concerns that may not be represented in other

adoption groups, but the identification that all individuals have a belief about what their job is and what it should entail allows this variable to be represented within the theme of BP.

Iteration Two

Iteration two increased the breadth and depth of the sample dataset significantly with the addition of twenty five new works. Table 2.1 contains the general information of the additional data elements.

Table 2.1

Overview Information of Second Iteration Additions to Dataset

Authors	Date	Participants	Organization	Model /Focus
Adams, Berner, & Wyatt	2004	Clinical managers	Medical clinic	Principles of reducing resistance (communication, user involvement, strategic use of consultants) are illustrated with a case study.
Bandura	1982	Various	N/A	Self-Efficacy and its impact on people's willingness to learn/change/grow in personal or career pursuits.
Cameron & Quinn	2011	Various	Various	Diagnosing and changing organizational culture and personal behaviour.
Clark	1998	Service technicians	Multi-national electronics firm	Diagnosing and solving motivation issues using the commitment and necessary effort (CANE) model.
Condly	1999	Students	Urban high school	Analysis of how variables in the CANE model relate to academic achievement.
Davis, Bagozzi, & Warshaw	1989	Students	Postsecondary institution	A study of user acceptance using TAM in comparison to the theory of reasoned action (TRA).
DeLone & McLean	1992	Various	Various	The development of a more integrated view of the concept of information systems success.
Doolin & Lowe	2002	N/A	N/A	An exploration in using actor-network theory's view of social relations in information systems research.
Fishbein &	1975	Various	Various	Presentation of the conceptual

Ajzen				framework of the theory of reasoned action (TRA).
Hall & Hord	1987	Teachers and faculty	Elementary, secondary and postsecondary	Presentation of the concerns-based adoption model (CBAM) for facilitating change.
Herzberg	1987	Various	Various	Presentation of the motivation-hygiene theory.
Karahanna, Straub, & Chervany	1999	All staff	Financial institution	A study of technology adoption across time using a model that combines aspects of TRA and diffusion of innovation (DI).
King	2002	All staff	Postsecondary institution	A multifaceted study of student, human resource, and financial information systems implemented in higher education over the past seven years.
King, Kvavik, & Voloudakis	2002	All staff	Postsecondary institution	A multifaceted study of student, human resource, and financial information systems implemented in higher education over the past seven years.
Klaus	2006	Professionals, faculty, and staff	University, airline, and cellular company	An exploratory study to understand reasons for user resistance and user resistance behaviours, and the management strategies to minimize user resistance.
Knutel	1998	Faculty	Postsecondary institution	A study to better understand the process through which faculty decide whether to adopt instructional technology.
Kotter	1996	Various	Various	The eight-stage process of creating major organizational change.
Lee	2006	Students	Postsecondary institution	An investigation of factors affecting the adoption of e-learning systems in mandatory and voluntary settings, through an extension of TAM.
Legris, Ingham, & Collerette	2003	Various	Various	A critical review of TAM with a view to understand why people use information technology.
Maurer	1997	Various	Various	A discussion of reasons for resistance and suggestion of methods for resolving it.
Orlikowski	1992	Various	Various	Development of a new theoretical model to examine the interaction

				between technology and organizations.
Plater	1995	Faculty	Postsecondary institution	American higher education is undergoing profound change pushed by six important forces.
Rogers	1995	Various	Various	Presentation of the DI.
Venkatesh & Davis	2000	Professionals, supervisors, and staff	Manufacturing, financial services, accounting, and investment banking	Development and testing of TAM2 that explains perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes.
Venkatesh, Morris, Davis, & Davis	2003	Various	Various	Formulates and tests the unified theory of acceptance and use of technology (UTAUT) model.

Table 2.2 contains the direct interpretation data of each work and the assigned coding. The entire dataset is represented in this table as some codes changed or matured as the iterative analysis and synthesis progressed.

Table 2.2

Interpretations and Coding of Second Iteration Dataset

Work	Interpretation	Coding
Adams, Berner, & Wyatt (2004)	"Given the expectation of encountering resistance, it was surprising that during the class as well as on the final evaluation this resistance did not appear at all" (p. 60).	EA EU
Bandura (1982)	"The process by which people develop interest in activities in which they initially lack skill, interest, and self-efficacy is an issue of some importance" (p. 133).	SE
Bandura (1982)	"Positive incentives are widely used to cultivate intrinsic interest....it is important to distinguish between whether incentives are used to manage performance or to cultivate personal efficacy" (p. 133).	SE UR
Cameron & Quinn (2011)	"Without a change in culture, most change initiatives, such as total quality management, downsizing, reengineering, and teamwork, fall short of expectations" (p. 159).	CM JC SO
Cameron & Quinn (2011)	"Changing an organization's culture is a difficult endeavor. It requires a great deal of commitment and dedication on the	CM LS

	part of the management team to make it work" (p. 163).	
Clark (1998)	"All human beings make commitments only to work goals that are perceived as increasing their individual and collective effectiveness and control. It is difficult to know in advance exactly how each individual and group defines 'effectiveness' or 'control'" (p. 8).	EC UR
Davis, Bagozzi, & Warshaw (1989)	"Both TRA and TAM postulated that BI is the major determinant of usage behavior; that behavior should be predictable from measures of BI, and that any other factors (PU and PEU) that influence user behavior do so indirectly by influencing BI" (p. 997).	BI EU UR
Davis, Bagozzi, & Warshaw (1989)	"The lack of a significant SN-BI effect was surprising, given previous IS research...More sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed" (p. 998).	BI SO
DeLone & McLean (1992)	"This taxonomy posits six major dimensions or categories of I/S success—system quality, information quality, use, user satisfaction, individual impact, and organizational impact" (p. 60).	EA SE SO TQ UR
Fishbein & Ajzen (1975)	"We found that intention to perform a given behavior is related to particular kinds of attitudes and beliefs, namely, attitudes toward the behavior and subjective norms concerning performance of the behavior" (p. 511).	BI EU SO UR
Hall & Hord (1987)	"The consistent theme…is that leaders are the focal point from which action, and its subsequent effects, emanates" (p. 19).	CM LS
Hall & Hord (1987)	"Understanding teachers' concerns in conjunction with knowledge of their level of use provides a richer picture and diagnostic basis for designing and facilitating interventions" (p. 40).	CM DT
Hall & Hord (1987)	"In the district and school examples that made up this case study, change was accomplished. It took time, involved many actors, and necessitated many interventions" (p. 135).	CM LS TI
Herzberg (1987)	"Distinguish between motivation and movement. Motivation is a function of growth from getting intrinsic rewards out of interesting and challenging work" (p. 14).	CM JC
Herzberg (1987)	"Hygienes (movement) can at best create no dissatisfaction on the job, and their absence creates dissatisfaction" (p. 15).	CI CM
Karahanna, Straub, & Chervany (1999)	"The relationship between voluntariness and subjective norm should be more closely investigated. According to TRA, voluntariness is not part of the subjective normative component. However, clearly voluntariness is a form of social influence" (p. 202).	MA SO

Karahanna, Straub, & Chervany (1999)	"These results represent an important first step toward a deeper understanding of the temporal evolution of beliefs, attitudes, norms, and behavior across different phases of the innovation process" (p. 203).	BI DE SE TI
King (2002)	"Resistance to change and internal expertise…were rated among the top barriers" (p. 5).	CM SE
King, Kvavik, & Voloudakis (2002)	"Colleges and universities considering student, human resource, and financial information systems should consider it a people project more than a technology project. The changes required in organizations, processes, training, support, and collaboration make these implementations highly people-intensive" (p. 10).	CM EA JC LS
Klaus (2006)	"Identified reasons for resistance: Uncertainty; Input; Control/Power; Self-Efficacy; Technical Problems; Complexity; Facilitating Environment; Communication; Training; Job/Job Skills Change; Workload; Lack of Fit" (p. 63).	BP CI EA EC EU JC LS SE TI TQ
Klaus (2006)	"Identified resistance behaviors: Overt-Active; Overt-Passive; Covert-Active; Covert-Passive" (p. 64).	CM
Klaus (2006)	"Identified management strategies: Top-down communication; Listen to Feedback; Provide Help/Support; Training; Incentives; Clear Consistent Plan; Management Expertise; System Customizations" (p. 65).	CI CM EA LS
Knutel (1998)	"There are 4 stages to the instructional technology adoption process: 1-awareness, 2-cognitive evaluation, 3-persuasion and decision, 4-implementation and confirmation" (p. 217-223).	BP CI DE EA EU SE SO TI TQ UR
Kotter (1996)	The Eight-stage process of creating major change. 1- Establishing a sense of urgency 2. Creating the guiding coalition 3. Developing a vision and strategy 4. Communicating the change vision 5. Empowering broad-based action 6. Generating short-term wins 7. Consolidating gains and producing more change 8. Anchoring new approaches in the culture (p. 21)	CI CM
Legris, Ingham, & Collerette (2003)	"The results of the meta-analysis tend to support the view...that TAM should be modified to include other components in order to explain consistently more than 40% of system use" (p. 202).	BI DT EC SO
Maurer (1997)	The most successful strategies to move beyond resistance and build support for change have six principles in common. 1. Build strong working relationships	CI CM

	2. Maintain a clear focus 3. Embrace resistance 4. Listen with an open mind 5. Stay calm to stay engaged 6. Join with the resistance (p. 10)	
O'Neill (2012)	"Universities are made up of multiple organizational cultures. Knowing and understanding how organizational culture and associated organizational characteristics influence central IT systems adoption might give university leadership an ability to effect central IT technology adoption, reduce costs associated with failed systems, and better position scarce university resources" (p. 212).	CI LS SO
Park (2003)	"In the current study, the adopters' perceived attributes of an innovation (i.e., relative advantage and complexity) were found to be important factors for faculty members' WAI use" (p. 72).	EU TQ UR
Park (2003)	"The results about the environmental factors (subjective norm, supports, and time) for WAI utilization in the current study should require more attention from instructional designers or change agents" (p. 72).	EA LS SO TI
Rogers (1995)	"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 34).	CI CM SO
Rogers (1995)	"The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption" (p. 35).	EA EU TQ UR
Siegel (2008)	"According to the research, the statistically significant predictors for all of the usage variables were perceived usefulness and attitude toward LiveText" (p. 76).	TQ BP UR
Suhy (2010)	"There is an association between faculty satisfaction with equipment and faculty satisfaction with technology and faculty technology use" (p. 226).	EU TQ UR
Suhy (2010)	"Davis (1989) pointed out that two major factors in information technology acceptance were ease of use and perceived usefulness of the technology. This study suggests that satisfaction is also a key element" (p. 232).	BP SO
Tsang-Kosma (2010)	"In addition to accessible functional support, leadership support at different levels emerged as a crucial factor toward the success of the SIS implementation" (p. 282).	EA LS
Tsang-Kosma (2010)	"It is inevitable for innovations adoption to involve unwanted change; therefore, it is necessary for organizations to plan for it" (p. 286).	CM LS
Venkatesh & Davis (2000)	"TAM2 provides a detailed account of the key forces underlying judgements of PU, explaining up to 60% of the	BP DT JC SO

	variance in this important driver of usage intentions" (p. 198).	UR
Venkatesh & Davis (2000)	"TAM2 extends TAM by showing that subjective norm exerts a significant direct effect on usage intentions over and above PU and PEU for mandatory (but not voluntary) systems" (p. 198).	DT MA SO
Venkatesh, Morris, Davis, & Davis (2003)	"UTAUT posits three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions). Significant moderating influences of experience, voluntariness, gender, and age were confirmed as integral features of UTAUT" (p. 467).	BI DE DG DT EC MA SO

With the broadening and deepening of the dataset, the meta-synthesis similarly progressed, resulting in refinement and expansion of the interpretational themes. Representative letters were not changed, but some themes matured and other themes were added. Table 2.3 represents the themes and their respective code letters from iteration two.

Table 2.3

Interpretational Themes Emerging from the Broadened Dataset

Code	Theme
BI	A person's behaviour intention is the best determinant of usage behaviour. The variables according to TAM are perceived usefulness and perceived ease of use but other variables have been identified.
BP	Individuals' beliefs about their job and what it should entail can result in resistance or adoption of a technology.
CI	Transparent communication of information about a technology implementation, and the opportunity to provide feedback will support adoption of technology.
CM	Technology adoption requires change. Appropriate change management can increase adoption.
DE	Direct experience with the technology results in a truer perception than indirect or short introductions to the technology.
DG	Demographics seem to have a very unreliable impact on technology adoption. Demographics have been suggested to be more a representation of comfort with technology than a distinct determinant.
DT	The use of determinants unmoderated by a more complex variable increases both power of prediction and clarity for interventions.
EA	Easy access to functional support and technical support encourages continued adoption of a technology.

EC	External control like facilitating conditions represents the individual's perception of support to achieve success. It can be some combination of CI-CM-EA-LS-MA-TI.
EU	How easy or complex a technology is to use will impact adoption through altering the perception of relative value to the individual.
JC	Changing aspects of a person's job can result in resistance or encourage adoption.
LS	Leadership's support of the technology in word and deed, and provision of time and/or money are important for adoption to occur.
MA	Mandatory adoption scenarios achieve higher levels of adoption, and it seems the usage of the technology helps people move beyond initial reluctance.
SE	Comfort with technology or perceived self-efficacy with a specific technology appear to be related and both are effected by time spent using the technology.
SO	Social or organizational variables like social norm in TRA seem to be unreliable in technology adoption. It appears that determinants within this category are clearly active in technology adoption and provide greater levels of reliability.
TI	The provision of time to change is seen as a resource. It takes time to learn or adapt to a technology; as such, time is critical to the success of change.
TQ	Poor technology quality as experienced in lack of stability and/or speed or lack of functionality will cause resistance to usage.
UR	Usefulness to the user or relative value to the user of a technology is the key predictor of adoption behaviour.

The required identification of questions, ideas, and concepts warranting further investigation following the data synthesis were again recorded and used for direction in theoretical sampling for iteration three. Table 2.4 contains the questions, ideas, and concepts from iteration two.

Table 2.4

Items Warranting Investigation from the Second Iteration Dataset

Work	Questions, ideas, and concepts warranting further investigation
Adams, Berner, & Wyatt (2004)	• The impact of providing training to professionals who are resistant to use of a technology
Bandura (1982)	• Cultivating intrinsic interest through development of self-efficacy • Using clearly stepped goals to increase self-efficacy
Cameron & Quinn (2011)	• Differences between cultural change and technology change
Clark (1998)	• Similarity of CANE variables to those of other models
Condly (1999)	The relevance of motivation to learn within high school students is not within the scope of the present study.

Davis, Bagozzi, & Warshaw (1989)	• Solid support for the direct relationship of behaviour intention (BI) to behaviour • The variables that impact BI can be summarized by perceived usefulness (PU) and perceived ease of use (PEU) • The lack of social norm (SN) impact • Effects of the external variables to PU, PEU, and SN seem critical?
DeLone & McLean (1992)	• System qualities impact use and user satisfaction • System use impacts satisfaction
Doolin & Lowe (2002)	This article explores the Actor-Network theory application to IS research but suggests no direct correlation to introduction or adoption variables.
Fishbein & Ajzen (1975)	• TRA is the foundational theory for TAM • Has TRA been advanced? Would that change TAM?
Hall & Hord (1987)	• The importance of leadership in change • Change as a process not event • User concerns change with usage • Interventions are necessary for adoption to occur • Change means someone has to change
Herzberg (1987)	• The opposite of dissatisfaction is not satisfaction • Hygiene-based interventions will not increase satisfaction • Motivation to adopt a technology will not be hygiene-based
Karahanna, Straub, & Chervany (1999)	• The relationship of subjective norm to mandatory or voluntary adoption • Time with the technology causes changes to adoption intention
King (2002)	• The consistency of resistance to change as the top barrier
King, Kvavik, & Voloudakis (2002)	• The focus needs to be on the changes to be made by staff rather than on the technology to be implemented.
Klaus (2006)	• Leadership/management role in adoption • The top five reasons for resistance did not match up directly with TAM variables
Knutel (1998)	• Implications of what faculty believe about pedagogy • The connection between expressions of "too busy" and lack of self-efficacy
Kotter (1996)	• Leadership's role in change • The connection between perceived usefulness and perceived control over success
Lee (2006)	• Subjective norm had no direct effect on intention in either mandatory or voluntary contexts The fact that subjective norm had no direct effect on intention in either mandatory or voluntary context raises questions as to its role in TAM; however, as the participants were students, the result requires cautious

	application to the present study.
Legris, Ingham, & Collerette (2003)	• The influence and guidance provided by external variables in TAM • The interconnectedness of technology adoption and organizational and/or social factors
Maurer (1997)	• Some aspects of the strategies for dealing with change resistance align with determinants within various technology adoption models
Orlikowski (1992)	The conceptual nature of Orlikowski's work does not directly align with the scope of the present study, but it does present the dual nature of technology as object and socially constructed product. This supports the evolving interpretation that there is a need to look at technology adoption from a human-centric as well as technology-centric framework.
Plater (1995)	The paper looks at faculty time, but it is primarily out of the scope of the current study. It confirms that faculty time is under pressure aside from any technology adoption faculty might be asked or required to consider but does not provide any insights into adoption variables.
Rogers (1995)	• The five attributes of innovations have some correlation with TAM variables and offer others not currently included • The necessity of time for diffusion of innovation/technology
Venkatesh & Davis (2000)	• TAM2 has a higher prediction rate than TAM • The key underlying difference appears to be the determinants
Venkatesh, Morris, Davis, & Davis (2003)	• The increased predictive power and intervention direction provided by using determinants rather than grouping them into variables • Determinants may act directly on behavior without the moderation of BI

Working with the dataset of the second iteration, the exclusion criteria were reviewed. The similarity of other working professionals' adoption behaviour to that of faculty appeared dependable, so the exclusion criteria were amended. The inclusion of non-adoption focused works associated to variables of technology adoption was explored in iteration two as a means to deepen understanding of their theory and application to adoption behaviour. Synthesis of these was cautious but showed value and will be continued into iteration three. The parallel and often identical characteristics of variables within prominent adoption models were clearly apparent. These variables and associated determinants were also cautiously included into the dataset. Studies that utilized determinants rather than moderating variables showed increased predictive

power. Perceived usefulness as a theme of variables was consistent in its predictive effect on adoption, but the variables under the theme of ease of use were not as consistent. The concepts of perceived ease of use and social norm both showed increased consistency when deconstructed into respective determinants (Legris, Ingham, & Collerette, 2003; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). This dynamic of determinants from which themes of adoption variables may be deriving their power will also be cautiously explored within the exclusion criteria of iteration three.

Iteration Three

Iteration three increased the breadth of the sample dataset with the addition of 13 new works. The depth of the dataset resulted primarily from the iterative analysis of the existing data elements. The questions, ideas, and concepts identified for further investigation in iteration two were fed back into the analysis of the dataset with the intent of refining ideas, not simply increasing the size of the sample (Weed, 2008). Items neither represented nor challenged in the existing data were investigated and added into the sample. Table 3.1 contains the general information of the additional data elements.

Table 3.1

Overview Information of Third Iteration Additions to Dataset

Authors	Date	Participants	Organization	Model /Focus
Anderson	2012	Faculty	Postsecondary institution	A study to identify distinctive influences which encourage or discourage teachers to adopt online teaching.
Ajzen	1991	N/A	N/A	Development and presentation of the theory of planned behavior (TPB).
Bandura	1977	Individuals	N/A	Presentation of the theoretical framework of self-efficacy and its central role in changes achieved in

				fearful and avoidant behavior.
Barley	1986	Radiologist and CT technologists	Hospital	Technology introduction and its effect on organizational structure, roles, and patterns of interaction.
Cule & Robey	2004	Executives and managers	Equipment manufacturer	Development of a process theory of organizational transformation.
Doppler	2004	Various	Various	A discussion of the core questions, issues, and strategies involved in managing change successfully.
Garrison & Vaughan	2013	Faculty	Postsecondary institution	A study that demonstrates how transformational institutional change related to blended teaching and learning approaches is predicated upon committed collaborative leadership that engages all levels of the institution.
Hofstede	1981	Various	Various	A discussion on culture and organizations.
Jasperson, Carte, Saunders, Butler, Croes, & Zheng	2002	Various	Various	A metatriangulation study that draws together the prior research on power and information technology.
Jiang, Muhanna, & Klein	2000	Various	Various	A study of user resistance and strategies for promoting acceptance across system types.
Lapointe & Rivard	2005	Doctors	Hospital	Development of a multilevel model of resistance to information technology implementation.
Markus	1983	Accountants	Chemical manufacturer	Basic theories of resistance are contrasted and evaluated, highlighting the value of the political version of the interaction theory to implementation of management information systems.
Orlikowski & Hofman	1997	Technical support specialists	Software solutions provider	Proposal of an alternative model of change management (improvisational model).

Table 3.2 contains the entire sample dataset with the direct interpretation data and assigned coding. Interpretational coding stabilized through this iteration, but the entire dataset is still represented in a single table to facilitate reference and evaluation.

Table 3.2

Interpretations and Coding of Third Iteration Dataset

Work	Interpretation	Coding
Adams, Berner, & Wyatt (2004)	"Given the expectation of encountering resistance, it was surprising that during the class as well on the final evaluation this resistance did not appear at all" (p. 60).	EA EU
Anderson (2012)	"This research revealed self-confidence to be the most pervasive and common factor in teachers' adoption decisions, and specifically self confidence in their ability to teach online" (p. 107).	SE
Anderson (2012)	"Contrary to literature, a significant finding of this study is that some teachers who enthusiastically embrace WBT do not regard time as a barrier and welcome the flexibility that WBT offers" (p. 115).	SE TI
Anderson (2012)	"Institutional support is an important element in teachers' adoption decisions. This support is expressed through policy, financial investment in systems and the provision of training and support personnel" (p. 126).	EA TQ
Ajzen (1991)	"Attitudes toward the behavior, subjective norms with respect to the behavior, and perceived control over the behavior are usually found to predict behavioral intentions with a high degree of accuracy" (p. 206).	EC SE SO
Bandura (1977)	"The theoretical framework presented in the present article is generalizable beyond the psychotherapy domain to other psychological phenomena involving behavioral choices and regulation of effort in activities that can have adverse effects" (p. 204).	DE SE
Bandura (1982)	"The process by which people develop interest in activities in which they initially lack skill, interest, and self-efficacy is an issue of some importance" (p. 133).	SE
Bandura (1982)	"Positive incentives are widely used to cultivate intrinsic interest....it is important to distinguish between whether incentives are used to manage performance or to cultivate personal efficacy" (p. 133).	SE UR
Barley (1986)	"Technologies do influence organizational structures in orderly ways, but their influence depends on the specific historical process in which they are embedded" (p. 107).	SO
Cameron & Quinn (2011)	"Without a change in culture, most change initiatives, such as total quality management, downsizing, reengineering, and teamwork, fall short of expectations" (p. 159).	CM JC SO
Cameron & Quinn (2011)	"Changing an organization's culture is a difficult endeavor. It requires a great deal of commitment and dedication on the	CM LS

	part of the management team to make it work" (p. 163).	
Clark (1998)	"All human beings make commitments only to work goals that are perceived as increasing their individual and collective effectiveness and control. It is difficult to know in advance exactly how each individual and group defines 'effectiveness' or 'control'" (p. 8).	EC UR
Davis, Bagozzi, & Warshaw (1989)	"Both TRA and TAM postulated that BI is the major determinant of usage behavior; that behavior should be predictable from measures of BI, and that any other factors (PU and PEU) that influence user behavior do so indirectly by influencing BI" (p. 997).	BI EU UR
Davis, Bagozzi, & Warshaw (1989)	"The lack of a significant SN-BI effect was surprising, given previous IS research...More sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed" (p. 998).	BI SO
DeLone & McLean (1992)	"This taxonomy posits six major dimensions or categories of I/S success—system quality, information quality, use, user satisfaction, individual impact, and organizational impact" (p. 60).	EA SE SO TQ UR
Doppler (2004)	"To deal with resistance in a constructive and positive way is one of the essential factors in successfully managing change" (p. 126).	CM
Doppler (2004)	"Change always takes longer than planned, they happen differently than expected, and everything will be tougher than hoped for" (p. 131).	CM
Fishbein & Ajzen (1975)	"We found that intention to perform a given behavior is related to particular kinds of attitudes and beliefs, namely, attitudes toward the behavior and subjective norms concerning performance of the behavior" (p. 511).	BI EU SO UR
Garrison & Vaughan (2013)	"The bottom line is that significant change is dependent upon collaborative leadership who can provide a clear vision, specific action plans, teaching recognition, and the resources to make it happen" (p. 26).	CI CM LS
Hall & Hord (1987)	"The consistent theme…is that leaders are the focal point from which action, and its subsequent effects emanates" (p. 19).	CM LS
Hall & Hord (1987)	"Understanding teachers' concerns in conjunction with knowledge of their level of use provides a richer picture and diagnostic basis for designing and facilitating interventions" (p. 40).	CM DT
Hall & Hord (1987)	"In the district and school examples that made up this case study, change was accomplished. It took time, involved many actors, and necessitated many interventions" (p. 135).	CM LS TI

Herzberg (1987)	"Distinguish between motivation and movement. Motivation is a function of growth from getting intrinsic rewards out of interesting and challenging work" (p. 14).	CM JC
Herzberg (1987)	"Hygienes (movement) can at best create no dissatisfaction on the job, and their absence creates dissatisfaction" (p. 15).	CI CM
Jasperson, Carte, Saunders, Butler, Croes, & Zheng (2002)	"Expectations regarding changes to power structures and power can serve as an important factor in decisions to adopt, promote, or develop IT even if the actions that result are not themselves particularly power-laden or political" (p. 427).	CM SO
Jiang, Muhanna, & Klein (2000)	"The change in job content and uncertainty were equally likely reasons in the context of both TPS and DSS, change in decision-making approach appears to be the most significant reason for resisting DSS" (p. 32).	CI JC
Karahanna, Straub, & Chervany (1999)	"The relationship between voluntariness and subjective norm should be more closely investigated. According to TRA, voluntariness is not part of the subjective normative component. However, clearly voluntariness is a form of social influence" (p. 202).	MA SO
Karahanna, Straub, & Chervany (1999)	"These results represent an important first step toward a deeper understanding of the temporal evolution of beliefs, attitudes, norms, and behavior across different phases of the innovation process" (p. 203).	BI DE SE TI
King (2002)	"Resistance to change and internal expertise…were rated among the top barriers" (p. 5).	CM SE
King, Kvavik, & Voloudakis (2002)	"Colleges and universities considering student, human resource, and financial information systems should consider it a people project more than a technology project. The changes required in organizations, processes, training, support, and collaboration make these implementations highly people-intensive" (p. 10).	CM EA JC LS
Klaus (2006)	"Identified reasons for resistance: Uncertainty; Input; Control/Power; Self-Efficacy; Technical Problems; Complexity; Facilitating Environment; Communication; Training; Job/Job Skills Change; Workload; Lack of Fit" (p. 63).	BP CI EA EC EU JC LS SE TI TQ
Klaus (2006)	"Identified resistance behaviors: Overt-Active; Overt-Passive; Covert-Active; Covert-Passive" (p. 64).	CM
Klaus (2006)	"Identified management strategies: Top-down communication; Listen to Feedback; Provide Help/Support; Training; Incentives; Clear Consistent Plan; Management Expertise; System Customizations" (p. 65).	CI CM EA LS
Knutel (1998)	"There are 4 stages to the instructional technology adoption process: 1-awareness, 2-cognitive evaluation, 3-persuasion and decision, 4-implementation and confirmation" (p. 217-	BP CI DE EA EU SE

	223).	SO TI TQ UR
Kotter (1996)	The Eight-stage process of creating major change. 1- Establishing a sense of urgency 2. Creating the guiding coalition 3. Developing a vision and strategy 4. Communicating the change vision 5. Empowering broad-based action 6. Generating short-term wins 7. Consolidating gains and producing more change 8. Anchoring new approaches in the culture (p. 21)	CI CM
Lapointe & Rivard (2005)	"When studying group resistance to IT in the early stages of implementation, independent, individual behaviors need to be analyzed rather than considering the group as a unified entity. In later stages, it then becomes important to understand how and why individual resistance behaviors converge" (p. 484).	CM
Legris, Ingham, & Collerette (2003)	"The results of the meta-analysis tend to support the view...that TAM should be modified to include other components in order to explain consistently more than 40% of system use" (p. 202).	BI DT EC SO
Markus (1983)	"The interaction theory has the apparent disadvantage of providing no universal, non-contingent advice to systems analysts and management implementers of systems" (p. 441).	CM SO
Markus (1983)	"The political variant makes some precise predictions about where resistance is likely to occur around the implementation of information systems. In general, one would not expect people who are disadvantaged in their power position by a system to accept it (gracefully), nor would one expect people who gain power to resist" (p. 442).	CM EC SO
Maurer (1997)	The most successful strategies to move beyond resistance and build support for change have six principles in common. 1. Build strong working relationships 2. Maintain a clear focus 3. Embrace resistance 4. Listen with an open mind 5. Stay calm to stay engaged 6. Join with the resistance (p. 10)	CI CM
O'Neill (2012)	"Universities are made up of multiple organizational cultures. Knowing and understanding how organizational culture and associated organizational characteristics influence central IT systems adoption might give university leadership an ability to affect central IT technology adoption, reduce costs associated with failed systems, and better position scarce university resources" (p. 212).	CI LS SO

Orlikowski & Hofman (1997)	"At least two sets of enabling conditions are critical: Aligning key dimensions of the change process and dedicating resources to provide ongoing support for the change process" (p. 18).	CM LS
Park (2003)	"In the current study, the adopters' perceived attributes of an innovation (i.e., relative advantage and complexity) were found to be important factors for faculty members' WAI use" (p. 72).	EU TQ UR
Park (2003)	"The results about the environmental factors (subjective norm, supports, and time) for WAI utilization in the current study should require more attention from instructional designers or change agents" (p. 72).	EA LS SO TI
Rogers (1995)	"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 34).	CI CM SO
Rogers (1995)	"The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption" (p. 35).	EA EU TQ UR
Siegel (2008)	"According to the research, the statistically significant predictors for all of the usage variables were perceived usefulness and attitude toward LiveText" (p. 76).	BP TQ UR
Suhy (2010)	"There is an association between faculty satisfaction with equipment and faculty satisfaction with technology and faculty technology use" (p. 226).	EU TQ UR
Suhy (2010)	"Davis (1989) pointed out that two major factors in information technology acceptance were ease of use and perceived usefulness of the technology. This study suggests that satisfaction is also a key element" (p. 232).	BP SO
Tsang-Kosma (2010)	"In addition to accessible functional support, leadership support at different levels emerged as a crucial factor toward the success of the SIS implementation" (p. 282).	EA LS
Tsang-Kosma (2010)	"It is inevitable for innovations adoption to involve unwanted change; therefore, it is necessary for organizations to plan for it" (p. 286).	CM LS
Venkatesh & Davis (2000)	"TAM2 provides a detailed account of the key forces underlying judgements of PU, explaining up to 60% of the variance in this important driver of usage intentions" (p. 198).	BP DT JC SO UR
Venkatesh & Davis (2000)	"TAM2 extends TAM by showing that subjective norm exerts a significant direct effect on usage intentions over and above PU and PEU for mandatory (but not voluntary) systems" (p. 198).	DT MA SO
Venkatesh, Morris, Davis, & Davis (2003)	"UTAUT posits three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior	BI DE DG DT

	(intention and facilitating conditions). Significant moderating influences of experience, voluntariness, gender, and age were confirmed as integral features of UTAUT" (p. 467).	EC MA SO

The broadening and deepening of the dataset supported the refining of the meta-synthesis, but it did not require the expansion of themes. To avoid unnecessarily repeating data, Table 2.3 also represents the themes and their respective codes from iteration three.

The required identification of questions, ideas, and concepts warranting further investigation following the data synthesis were again recorded to be used for direction in theoretical sampling for iteration four. The evidence of theoretical saturation began to appear in the diminished number of items to be investigated and the interpretation of some elements as having limited addition contribution to the synthesis in its current state. Table 3.3 contains the questions, ideas, and concepts requiring further investigation along with the interpretations of limited contribution.

Table 3.3

Items Warranting Investigation from Additions to Third Iteration Dataset

Work	Questions, ideas, and concepts warranting further investigation
Anderson (2012)	• Means of increasing Self-efficacy
Ajzen (1991)	• The addition of a construct for behavioral control (perceived self-efficacy plus facilitating conditions) plays an important role in behavioral prediction
Bandura (1977)	• Perceived self-efficacy impacts change • Self-efficacy can be increased for a respective situation
Barley (1986)	• Technology is a social as well as physical object
Cule & Robey (2004)	The article focuses on organizational change but not on technology introduction change. The model consists of three sequential phases that provided no specific insight to technology introduction or acceptance.
Doppler (2004)	• Constructive conflict
Garrison & Vaughan (2013)	The need for leadership and leadership support by way of time and/or money for change to occur align with what other data have indicated.
Hofstede (1981)	Hofstede explores culture and its impact on organizations, but little

	connection is explored in the context of change except to indicate that an organization's own history constrains its options for change.
Jasperson, Carte, Saunders, Butler, Croes, and Zheng (2002)	• Power structures and changes to power impact technology adoption
Jiang, Muhanna, & Klein (2000)	The work identified key reasons for user resistance and remedies designed to promote acceptance. It is built on the premise that "there is no fundamental resistance to every change on the part of users" (p. 25). Other works have suggested that resistance is quite common and basically a default response to most change (Kotter, 1996).
Lapointe & Rivard (2005)	• Appropriate responses to resistance The theory provides insight to the concept of resistance, but there seems to be some rationalization of all resistance to power. One case example in the study was successful. Leadership recognized there was a valid concern to the resistance. The doctors in each case had concern about the system's impacts on their work. In each case, they demonstrated resistant behaviour, but only in case 2 did leadership take real consideration of what the doctors were trying to point out. There were power struggles occurring, but those existed before the system and would continue after the system.
Markus (1983)	The political variant of the interaction theory appears to be the most useful view to power and its impact on technology adoption.
Orlikowski & Hofman (1997)	Another approach to change management that affirms the need for resources and support.

As with the second iteration, the exclusion criteria were again reviewed in context to the third iteration dataset. The criteria were deemed relevant. The criteria included working professionals in various organizations and the cautious inclusion of non-adoption focused works associated specifically to variables of technology adoption for means of deepening understanding. Works containing the parallel and often identical characteristics of variables within prominent adoption models and their associated determinants were also included into the criteria. The correspondence between consistent and increased predictive and interpretative powers and the use of determinants without moderating variables was emerging as a significant

dynamic in the synthesis. The parsimony of TAM is one of its strengths, but the use of determinants invigorated both social norm theme and behaviour control theme variables: both categories of known weakness in TAM.

Iteration Four

Iteration four increased the breadth of the sample dataset with the addition of eight new works. The depth of the dataset was driven extensively by the iterative analysis of the existing data elements. The questions, ideas, and concepts identified for further investigation in iteration three were fed back into the analysis. Theoretical saturation was evident in the similarity of data and the limited significance of newly introduced data. Triangulation was also occurring as synthesis of the multiple data elements provided affirmation of the emerging interpretational themes. The construction of the sample dataset with works utilizing multiple research methods applied to various sources of data collected from similar and dissimilar environments provided for an increased level of confidence in the interpretation (Kalof, Dan, & Dietz, 2008). Table 4.1 contains the general information of the additional data elements for iteration four.

Table 4.1

Overview Information of Fourth Iteration Additions to Dataset

Authors	Date	Participants	Organization	Model /Focus
Adams	1965	Various	Various	The development of a theory of inequity from which it is possible to specify the antecedents and consequences of injustice in human exchanges.
Coleman, Deutsch, & Marcus	2014	Various	Various	The book is meant to deepen the understanding of the processes involved in conflicts and how to manage them constructively.
Follett	1925	N/A	N/A	An argument for constructive conflict.
Hess, Joshi,	2010	Students	Postsecondary	The consideration of an equity

& McNab			institution	comparison perspective on technology acceptance using the equity implementation model (EIM).
Joshi	1991	Various	Hospital laboratory, and bank	The use of equity theory to develop EIM as a means to explain resistance to change.
Marshall	2010	Faculty and staff	Postsecondary institution	Exploration of evidence from e-learning benchmarking activities in an attempt to understand change in universities in response to technology.
Robey & Farrow	1982	Management	Various	Development of a model of user involvement in information system development based on constructive conflict.
Schunk	1991	Students	Secondary education institution	Discussion of self-efficacy theory and academic motivation, pointing out substantive issues that need to be addressed.

Table 4.2 contains the entire sample dataset with the direct interpretation data and assigned coding.

Table 4.2

Interpretations and Coding of Fourth Iteration Dataset

Work	Interpretation	Coding
Adams (1965)	"The presence of inequity will motivate a person to achieve equity or to reduce inequity, and the strength of motivation to do so will vary directly with the magnitude of inequity experienced" (p. 283).	JC SO
Adams, Berner, & Wyatt (2004)	"Given the expectation of encountering resistance, it was surprising that during the class as well as on the final evaluation this resistance did not appear at all" (p. 60).	EA EU
Anderson (2012)	"This research revealed self-confidence to be the most pervasive and common factor in teachers' adoption decisions, and specifically self confidence in their ability to teach online" (p. 107).	SE
Anderson (2012)	"Contrary to literature, a significant finding of this study is that some teachers who enthusiastically embrace WBT do not regard time as a barrier and welcome the flexibility that WBT offers" (p. 115).	SE TI

Anderson (2012)	"Institutional support is an important element in teachers' adoption decisions. This support is expressed through policy, financial investment in systems and the provision of training and support personnel" (p. 126).	EA TQ
Ajzen (1991)	"Attitudes toward the behavior, subjective norms with respect to the behavior, and perceived control over the behavior are usually found to predict behavioral intentions with a high degree of accuracy" (p. 206).	EC SE SO
Bandura (1977)	"The theoretical framework presented in the present article is generalizable beyond the psychotherapy domain to other psychological phenomena involving behavioral choices and regulation of effort in activities that can have adverse effects" (p. 204).	BI DE SE
Bandura (1982)	"The process by which people develop interest in activities in which they initially lack skill, interest, and self-efficacy is an issue of some importance" (p. 133).	SE
Bandura (1982)	"Positive incentives are widely used to cultivate intrinsic interest....it is important to distinguish between whether incentives are used to manage performance or to cultivate personal efficacy" (p. 133).	SE UR
Barley (1986)	"Technologies do influence organizational structures in orderly ways, but their influence depends on the specific historical process in which they are embedded" (p. 107).	SO
Cameron & Quinn (2011)	"Without a change in culture, most change initiatives, such as total quality management, downsizing, reengineering, and teamwork, fall short of expectations" (p. 159).	CM JC SO
Cameron & Quinn (2011)	"Changing an organization's culture is a difficult endeavor. It requires a great deal of commitment and dedication on the part of the management team to make it work" (p. 163).	CM LS
Clark (1998)	"All human beings make commitments only to work goals that are perceived as increasing their individual and collective effectiveness and control. It is difficult to know in advance exactly how each individual and group defines "effectiveness" or "control" (p. 8).	EC UR
Davis, Bagozzi, & Warshaw (1989)	"Both TRA and TAM postulated that BI is the major determinant of usage behavior; that behavior should be predictable from measures of BI, and that any other factors (PU and PEU) that influence user behavior do so indirectly by influencing BI" (p. 997).	BI EU UR
Davis, Bagozzi, & Warshaw (1989)	"The lack of a significant SN-BI effect was surprising, given previous IS research...More sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed" (p. 998).	BI SO

DeLone & McLean (1992)	"This taxonomy posits six major dimensions or categories of I/S success—system quality, information quality, use, user satisfaction, individual impact, and organizational impact" (p. 60).	EA SE SO TQ UR
Doppler (2004)	"To deal with resistance in a constructive and positive way is one of the essential factors in successfully managing change" (p. 126).	CM
Doppler (2004)	"Change always takes longer than planned, they happen differently than expected, and everything will be tougher than hoped for" (p. 131).	CM
Fishbein & Ajzen (1975)	"We found that intention to perform a given behavior is related to particular kinds of attitudes and beliefs, namely, attitudes toward the behavior and subjective norms concerning performance of the behavior" (p. 511).	BI EU SO UR
Follett (1925)	"There are three ways of dealing with conflict: domination -a victory of one side over the other; compromise -each side gives a little; and integration -a solution in which the desires of both sides have found a place" (p. 2).	CM
Garrison & Vaughan (2013)	"The bottom line is that significant change is dependent upon collaborative leadership who can provide a clear vision, specific action plans, teaching recognition, and the resources to make it happen" (p. 26).	CI CM LS
Hall & Hord (1987)	"The consistent theme…is that leaders are the focal point from which action, and its subsequent effects emanates" (p. 19).	CM LS
Hall & Hord (1987)	"Understanding teachers' concerns in conjunction with knowledge of their level of use provides a richer picture and diagnostic basis for designing and facilitating interventions" (p. 40).	CM DT
Hall & Hord (1987)	"In the district and school examples that made up this case study, change was accomplished. It took time, involved many actors, and necessitated many interventions" (p. 135).	CM LS TI
Herzberg (1987)	"Distinguish between motivation and movement. Motivation is a function of growth from getting intrinsic rewards out of interesting and challenging work" (p. 14).	CM JC
Herzberg (1987)	"Hygienes (movement) can at best create no dissatisfaction on the job, and their absence creates dissatisfaction" (p. 15).	CI CM
Hess, Joshi, & McNab (2010)	"The equity comparisons explained additional variance in adoption intentions for online discussion form (ODF) over existing acceptance models, and the moderating effect of facilitating conditions (FC) provided novel insight into the importance of enhancing users' perceived behavioral control in the use of new technology" (p. 146).	SO EC
Jasperson, Carte,	"Expectations regarding changes to power structures and	CM

Saunders, Butler, Croes, & Zheng (2002)	power can serve as an important factor in decisions to adopt, promote, or develop IT even if the actions that result are not themselves particularly power-laden or political" (p. 427).	SO
Jiang, Muhanna, & Klein (2000)	"The change in job content and uncertainty were equally likely reasons in the context of both TPS and DSS, change in decision-making approach appears to be the most significant reason for resisting DSS" (p. 32).	CI JC
Joshi (1991)	"Users employ three levels of analysis (personal, organizational, others) in evaluating the change introduced by an implementation. Users who evaluate the change to be unfavorable in terms of inequity or loss of equity are likely to be distressed by the change and resist it" (p. 229).	JC SO UR
Karahanna, Straub, & Chervany (1999)	"The relationship between voluntariness and subjective norm should be more closely investigated. According to TRA, voluntariness is not part of the subjective normative component. However, clearly voluntariness is a form of social influence" (p. 202).	MA SO
Karahanna, Straub, & Chervany (1999)	"These results represent an important first step toward a deeper understanding of the temporal evolution of beliefs, attitudes, norms, and behavior across different phases of the innovation process" (p. 203).	BI DE SE TI
King (2002)	"Resistance to change and internal expertise…were rated among the top barriers" (p. 5).	CM SE
King, Kvavik, & Voloudakis (2002)	"Colleges and universities considering student, human resource, and financial information systems should consider it a people project more than a technology project. The changes required in organizations, processes, training, support, and collaboration make these implementations highly people-intensive" (p. 10).	CM EA JC LS
Klaus (2006)	"Identified reasons for resistance: Uncertainty; Input; Control/Power; Self-Efficacy; Technical Problems; Complexity; Facilitating Environment; Communication; Training; Job/Job Skills Change; Workload; Lack of Fit" (p. 63).	BP CI EA EC EU JC LS SE TI TQ
Klaus (2006)	"Identified resistance behaviors: Overt-Active; Overt-Passive; Covert-Active; Covert-Passive" (p. 64).	CM
Klaus (2006)	"Identified management strategies: Top-down communication; Listen to Feedback; Provide Help/Support; Training; Incentives; Clear Consistent Plan; Management Expertise; System Customizations" (p. 65).	CI CM EA LS
Knutel (1998)	"There are 4 stages to the instructional technology adoption process: 1-awareness, 2-cognitive evaluation, 3-persuasion and decision, 4-implementation and confirmation" (p. 217-223).	BP CI DE EA EU SE SO TI

		TQ UR
Kotter (1996)	The Eight-stage process of creating major change. 1- Establishing a sense of urgency 2. Creating the guiding coalition 3. Developing a vision and strategy 4. Communicating the change vision 5. Empowering broad-based action 6. Generating short-term wins 7. Consolidating gains and producing more change 8. Anchoring new approaches in the culture (p. 21)	CI CM
Lapointe & Rivard (2005)	"When studying group resistance to IT in the early stages of implementation, independent, individual behaviors need to be analyzed rather than considering the group as a unified entity. In later stages, it then becomes important to understand how and why individual resistance behaviors converge" (p. 484).	CM
Legris, Ingham, & Collerette (2003)	"The results of the meta-analysis tend to support the view...that TAM should be modified to include other components in order to explain consistently more than 40% of system use" (p. 202).	BI DT EC SO
Marcus (2014)	"The process of change is, at its core, one of conflict resolution. Therefore, one can think of change as an outcome of a constructive or destructive conflict resolution process and the process of change as a series of conflict resolution activities that lead to some new (changed) end state" (p. 513).	CM
Markus (1983)	"The interaction theory has the apparent disadvantage of providing no universal, non-contingent advice to systems analysts and management implementers of systems" (p. 441).	CM SO
Markus (1983)	"The political variant makes some precise predictions about where resistance is likely to occur around the implementation of information systems. In general, one would not expect people who are disadvantaged in their power position by a system to accept it (gracefully), nor would one expect people who gain power to resist" (p. 442).	CM EC SO
Marshall (2010)	"The evidence from the e-learning maturity model (eMM) assessments presented in this paper suggest that, to date, decisions have been made primarily with the intention of engaging in 'sustaining' and 'mimetic' forms of change and that universities as organisations as yet show little capability to disrupt their existing educational models" (p. 188).	CM LS
Maurer (1997)	The most successful strategies to move beyond resistance and build support for change have six principles in common. 1. Build strong working relationships 2. Maintain a clear focus 3. Embrace resistance	CI CM

	4. Listen with an open mind 5. Stay calm to stay engaged 6. Join with the resistance (p. 10)	
O'Neill (2012)	"Universities are made up of multiple organizational cultures. Knowing and understanding how organizational culture and associated organizational characteristics influence central IT systems adoption might give university leadership an ability to affect central IT technology adoption, reduce costs associated with failed systems, and better position scarce university resources" (p. 212).	CI LS SO
Orlikowski & Hofman (1997)	"At least two sets of enabling conditions are critical: Aligning key dimensions of the change process and dedicating resources to provide ongoing support for the change process" (p. 18).	CM LS
Park (2003)	"In the current study, the adopters' perceived attributes of an innovation (i.e., relative advantage and complexity) were found to be important factors for faculty members' WAI use" (p. 72).	EU TQ UR
Park (2003)	"The results about the environmental factors (subjective norm, supports, and time) for WAI utilization in the current study should require more attention from instructional designers or change agents" (p. 72).	EA LS SO TI
Robey & Farrow (1982)	"Participation is only effective if it allows users to exert influence toward both conflict generation and its constructive resolution" (p. 83).	CM
Rogers (1995)	"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 34).	CI CM SO
Rogers (1995)	"The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption" (p. 35).	BI EA EU TQ UR
Siegel (2008)	"According to the research, the statistically significant predictors for all of the usage variables were perceived usefulness and attitude toward LiveText" (p. 76).	BP TQ UR
Suhy (2010)	"There is an association between faculty satisfaction with equipment and faculty satisfaction with technology and faculty technology use" (p. 226).	EU TQ UR
Suhy (2010)	"Davis (1989) pointed out that two major factors in information technology acceptance were ease of use and perceived usefulness of the technology. This study suggests that satisfaction is also a key element" (p. 232).	BP SO
Tsang-Kosma (2010)	"In addition to accessible functional support, leadership support at different levels emerged as a crucial factor toward the success of the SIS implementation" (p. 282).	EA LS

Tsang-Kosma (2010)	"It is inevitable for innovations adoption to involve unwanted change; therefore, it is necessary for organizations to plan for it" (p. 286).	CM LS
Venkatesh & Davis (2000)	"TAM2 provides a detailed account of the key forces underlying judgements of PU, explaining up to 60% of the variance in this important driver of usage intentions" (p. 198).	BP DT JC SO UR
Venkatesh & Davis (2000)	"TAM2 extends TAM by showing that subjective norm exerts a significant direct effect on usage intentions over and above PU and PEU for mandatory (but not voluntary) systems" (p. 198).	DT MA SO
Venkatesh, Morris, Davis, & Davis (2003)	"UTAUT posits three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions). Significant moderating influences of experience, voluntariness, gender, and age were confirmed as integral features of UTAUT" (p. 467).	BI DE DG DT EC MA SO

The refining of the interpretational meta-synthesis continued, but there was no expansion of themes; therefore, to avoid unnecessarily repeating data, Table 2.3 continues to represent the themes and their respective codes from iteration four.

Iteration four was judged to have attained theoretical saturation. Reflecting this achievement, the required identification of questions, ideas, and concepts warranting further investigation following the data synthesis transitioned into a record of specific interpretations derived for each additional data element. Table 4.3 contains the individual interpretations for each newly analyzed work.

Table 4.3

Interpretations of Additional Elements of the Fourth Iteration Dataset

Work	Questions, ideas, and or concepts warranting further investigation
Adams (1965)	This work develops a theory of inequity from which it is possible to specify the antecedents and consequences of injustice in human exchanges. The most direct correlation of this to the current project is in elaboration of resistance behaviours.
Coleman, Deutsch, &	Resistance to change was identified by many works through many

Marcus (2014)	different methods and in many different circumstances as the primary reason for technology implementations not achieving the expected outcome or for final utilization being much lower than intended or required. This work, as with others focused on change, presents resistance (conflict) as positive and an important part of the process to achieve a changed end state (new technology fully adopted).
Follett (1925)	An obscure reference to Mary Parker Follett by Doppler (2004) was investigated. A Google search on Follett indicated that she was an early proponent of the concept of constructive conflict. A search for seminal works on constructive conflict resulted in references to Morton Deutsch, and he had some very recent works. A specific search of constructive conflict and technology introduction highlighted Robey and Farrow (1982).
Hess, Joshi, & McNab (2010)	This work used university students in a voluntary adoption situation as participants. As has been discussed this is a very different dynamic than an organization employee situation, yet the effect of facilitating conditions does affirm findings from other model extensions, with different participants.
Joshi (1991)	This work raised the question of the insights equity theory might hold for technology adoption. A search was undertaken within the present iteration to broaden the analysis out to other related documents. A search for newer and/or other works on equity theory and/or equity implementation theory resulted in Adams (1965) and Hess, Joshi, and McNab (2010). Developing an equity-implementation model under the premise that "changes that are considered favorable are not resisted…while changes considered unfavorable are likely to be resisted" (p. 229) seems a weak foundation when the author uses a pay raise as an example of change that people accept readily. This example suggests a very wide definition of change. To receive a pay raise doesn't require anything different of the individual. He or she can continue to go about the workday exactly the same after the raise, which is clearly not typically the case with technology adoption. This equity-implementation model provides general insight and support to social or organization themes of variables, but offers limited direct applicability within TAM.
Marshall (2010)	This work was affirmative of the challenge that technology adoption is within the postsecondary environment and the challenge of change in general within postsecondary education.
Robey & Farrow (1982)	The model of user involvement that is developed by this work provides insight into what the effect identified with involvement may actually be founded upon. The identification that it is not involvement itself, but the conflict that arises from involvement and the subsequent constructive or destructive resolution of that conflict that is the actual

	significant aspect of involvement is potent. It disentangles some of the mixed outcomes that involvement can result in and ties it to a direct and purposeful process of technology introduction and adoption that uses constructive conflict resolution.
Schunk (1991)	The work falls outside of the exclusion criteria for the present study. The work looks at self-efficacy and motivation of students in academics. The alignment of associated constructs of self-efficacy and their respective relevance to academic motivation can be seen to affirm the correlation that exists between self-efficacy constructs and their impact within adoption behaviour.

This chapter presents the results of the study with supporting data. A total of 51 secondary works were ultimately included in the sample dataset for synthesis. Results are presented in a sequence aligned with the iterative nature of meta-interpretation.

Chapter Five: Conclusions and Recommendations

Chapter Five provides a summary of the study, presents the meta-synthesis results, proposes a conclusion and representative theoretical alteration to the technology acceptance model, and makes recommendations for possible management practices for enhancing technology adoption. As well, it describes opportunities for future study.

Summary

This study explores the behaviour of technology adoption by professionals with the objective being identification of means to enhance technology adoption within postsecondary institutions. Chapter One introduced the issue, defined the purpose and significance of the study, and proposed the questions that would guide the investigation. Chapter Two provided a foundation of technology adoption research with a review of prominent models from both technology-focused and human-focused streams of study. The chapter also introduced the interrelated topics of change, resistance, and conflict. Chapter Three identified the methodology

of this project as a qualitative meta-synthesis intended to exploit the valuable data source of existing research. Chapter Four presented the interpretations and representative interpretational coding of the works within the synthesis dataset. The presentation was structured to reflect the iterative process of the theoretical sampling. Synthesis of the data gathered in this study resulted in the summary interpretation and conclusions that follow.

Results

Davis, Bagozzi, and Warshaw (1989) technology acceptance model (TAM) was the exiting model from which this study intended to develop an extension or modification. Working with the established key influences of adoption as determined by TAM and the first five works chosen as a maximum variation sample for this study the iterative theoretical sampling and interpretation synthesis resulted in the summary below.

Behaviour intention (BI). Derived from the work of Fishbein and Ajzen (1975), an individual's intention to perform a specific behaviour is the best predictor of the performance. Davis et al.'s (1989) TAM aligned BI with technology adoption through the moderating variables of perceived usefulness and perceived ease of use. They removed the social influence that was part of TRA but noted that "More sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed" (p. 998). Fishbein and Ajzen's (1975) TRA model also contained an explicit feedback loop. This recognition that individual's beliefs, attitudes, or perceptions change over time was not represented in TAM. Adoption intentions clearly evolve. Individuals will have an initial perception of ease of use, but as they have direct experience with technology, their perception can change (Bandura, 1997).

Direct experience with technology (DE). Other determinants of intention are also impacted by this temporal and experiential evolution (Karahanna, Straub, & Chervany, 1999; Rogers, 1995; Venkatesh, Morris, Davis, & Davis, 2003). In the proposed model, this result is represented in the continued use of behaviour intention to use technology as the primary predictor of actual technology usage. It is also the reason for the reintroduction of an explicit feedback loop.

Beliefs about profession (BP). Individuals' beliefs about their job and what it should entail can result in positive or negative perceptions of a technology (Jiang, Muhanna, & Klein, 2000; Siegel, 2008). A technology that supports or enhances a professional's practices will motivate adoption (Herzberg, 1987; Joshi, 1991; Siegel, 2008; Venkatesh & Davis, 2000). A technology that contravenes a professional's practices will, at the least, be viewed as a poor fit for his or her job and, more significantly, will likely be perceived as causing job changes and power structure changes.

Job changes and power (JC). Changes of this nature result in resistance (Adams, 1965; Cameron & Quinn, 2011; Jasperson et al., 2002; Jiang, Muhanna, & Klein, 2000; Joshi, 1991; King, 2002; Klaus, 2006; Lapointe & Rivard, 2005; Markus, 1983). In the proposed model, this result is represented in two distinct determinants of perceived job compatibility of using the technology and perceived impact to job in using the technology.

Communication and information (CI). Transparent communication and regular information about a technology implementation is important to lowering resistance and supporting adoption (Jiang, Muhanna, & Klein, 2000; Klaus, 2006; Knutel, 1998; Kotter, 1996; Maurer, 1997; Rogers, 1995). The opportunity for two-way communication that allows for feedback and a sense of participation will similarly support adoption of technology, but it must

be undertaken with authenticity and allow for constructive conflict resolution to be effective (Coleman, Deutsch, & Marcus, 2014; Doppler, 2004; Herzberg, 1987; Klaus, 2006; Robey & Farrow, 1982). In the proposed model, this result is coupled with change management and represented in the addition of an overt element within the feedback and intervention flow.

Change management (CM). Technology adoption requires change. Tsang-Kosma (2010) challenged that "it is inevitable for innovations adoption to involve unwanted change; therefore, it is necessary for organizations to plan for it" (p. 286). A key assumption of this study was that enhancement of TAM would support institutions in developing effective interventions to increase technology adoption and final usage. There is no practical value in understanding technology adoption behaviour except for this purpose. Change as Coleman, Deutsch, and Marcus (2014) describe it is "at its core, one of conflict resolution" (p. 513). Consequently, regardless of the label, appropriate change management or constructive conflict resolution will increase adoption (Doppler, 2004; Hall & Hord, 1987; Jasperson et al., 2002; King, Kvavik, & Voloudakis, 2002; Lapointe & Rivard, 2005; Markus, 1983; Maurer, 1997; Robey & Farrow, 1982). It is also evident that this change process, which is technology adoption, requires leadership support.

Leadership support (LS). Garrison and Vaughan (2013) interpreted their results as indication that "significant change is dependent upon collaborative leadership who can provide a clear vision, specific action plans, teaching recognition, and the resources to make it happen" (p. 26). Orlikowski and Hofman (1997) identified analogous critical elements as did Hall and Hord (1987), who summarized their extensive experience as having shown consistently "that leaders are the focal point from which action, and its subsequent effects emanates" (p. 19). In the

proposed model, this result is represented in the addition of the change management component. It is also in the determinant of perceived leadership support in using the technology.

Demographics of age and gender (DG). TAM makes no references to gender or age. There have been studies that included differentiation of technology adoption determinants based on age and/or gender, but results across these studies have ranged from inconclusive to inconsistent (Suhy, 2010). Demographics as a distinct determinant have limited support, but Venkatesh, Morris, Davis, and Davis (2003) posit gender and age as having moderating influences within UTAUT. In the proposed model, as in the original TAM, age and gender are not identified as distinct determinants.

Determinants and external variables (DT). TAM has a single box at the left side of the model that is labeled "external variables." The use of the fundamental variables' *perceived usefulness* and *perceived ease of use* was intended to trace "the impact of external factors on internal beliefs, attitudes, and intentions" (Davis, Bagozzi, & Warshaw, 1989, p. 985). As research utilizing TAM expanded, and as Davis himself undertook later studies, it is apparent that these fundamental variables were recognized as essentially diminishing the information originating from the representative determinants (Legris, Ingham, & Collerette, 2003; Venkatesh & Davis, 2000). By using determinants unmoderated by a more complex variable, the power of prediction increases as does the clarity on direction for intervention (Venkatesh, Morris, Davis, & Davis, 2003).

Easy access to support (EA). Easy access to functional and technical support is an important element in faculty adoption decisions (Anderson, 2012; Park, 2003; Tsang-Kosma, 2010). This important form of institutional support starts with initial training and continues through the adoption process with resources being available to encourage continued adoption and

utilization (Adams, Berner, & Wyatt, 2004; King, Kvavik, & Voloudakis, 2002; Klaus, 2006). The quality and availability of this type of institutional support is often intermingled with the individuals' perception of external controls and conditions.

External controls and conditions (EC). Venkatesh, Morris, Davis, & Davis (2003) UTAUT identified two direct determinants of usage behaviour as the intention to adopt and facilitating conditions. As interpreted previously, UTAUT illustrates a progression from the use of moderating variables to the use of unmoderated determinants. The interplay of internal control as captured by self-efficacy (Bandura, 1977) and perceived support from the organization as captured by facilitating conditions was themed by Ajzen (1991) as behavioural control. This variable encapsulates the perception of "*Can I do this task?* (Siegal, 2008, p. 35)" with the perception of *Will I be able to succeed*? Ajzen (1991) extended the theory of TRA by adding this behavioural control variable in his development of TPB. Since TAM predated TPB, it had not included this variable. The parsimony of TAM is one of its strengths, but UTAUT clearly demonstrates that determinants such as external control hold significant importance for predicting the behaviour of technology adoption (Clark, 1998; Hess, Joshi, & McNab, 2010; Venkatesh, Morris, Davis, & Davis, 2003).). In the proposed model, this result is represented in the determinants of perceived access to technical support for using the technology along with the determinants of perceived leadership support in using the technology and perceived self-efficacy for the technology.

Ease of use (EU). TRA and TAM both postulate that intention (BI) to adopt is the major element of actual adoption behaviour. TAM narrowed the scope of TRA and proposed that two variables, perceived usefulness and perceived ease of use, were the key influencers of BI (Davis, Bagozzi, & Warshaw, 1989). How easy a technology is to use or the perceived complexity of the

technology does exert influence on adoption, but the impact of this influence evolves over time and usage (Karahanna, Straub, & Chervany, 1999). As a result of this evolution, perceived ease of use does not have the predictive consistency of perceived usefulness. The variable shows increased consistency when deconstructed into respective determinants of self-efficacy, technology characteristics, training, and support (Davis, Bagozzi, & Warshaw, 1989; Legris, Ingham, & Collerette, 2003; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). In the proposed model, this result is represented in the discontinuance of the TAM variable of perceived ease of use.

Mandatory adoption (MA). Mandatory adoption scenarios regularly achieve higher levels of adoption than do voluntary adoption scenarios. Beyond the obvious reason of the adoption being mandatory, the actual relationship mandatory and voluntary implementation have on the variables of behavioural intention is much less obvious (Karahanna, Straub, & Chervany, 1999). The relationship between usage and the perception of self-efficacy is intertwined (Bandura, 1982). The social-based variables such as subjective norm are also affected by mandatory or voluntary implementation. TAM2 actually identified that subjective norm exerts a significant direct effect on usage intentions over and above perceived usefulness and perceived ease of use in mandatory adoptions. In voluntary adoptions, the effect on usage intention was insignificant (Venkatesh & Davis, 2000). In the proposed model, this result is represented in the introduction of the determinant of perceived voluntariness of using the technology.

Self-efficacy with technology (SE). Davis, Bagozzi, and Warshaw (1989) hypothesized that Bandura's (1977) self-efficacy was one of the external variables of perceived ease of use. This comfort with technology in general or perceived efficacy with a specific technology is powerfully related to adoption intentions (Anderson, 2012; King, 2002; Klaus, 2006). In the

proposed model, this result is represented in the determinant of perceived self-efficacy and the discontinuance of perceived ease of use.

Social and organizational (SO). Social and organizational variables such as social norm in TRA were determined to have no significance for TAM. Davis, Bagozzi, and Warshaw (1989) were surprised by this lack of significance and recommended that "more sophisticated methods for assessing the specific types of social influence processes" (p. 998) were needed. Since its initial development, extensions of TAM have regularly included social influence variables in the pursuit for sophistication (Hess, Joshi, & McNab, 2010; Legris, Ingham, & Collerette, 2003; Park, 2003; Suhy, 2010; Venkatesh & Davis, 2000). Joshi (1999) posited that "users employ three levels of analysis (personal, organizational, others) in evaluating the change introduced by an implementation" (p. 229). This equity assessment includes social elements and incorporates the dynamics of power resident in structures. It exposes the connection between technology introduction and changes to power structures and power. Consequently there can be little uncertainty that social determinants are important to adoption behaviour (Jasperson, Carte, Saunders, Butler, Croes, & Zheng, 2002). UTAUT achieved higher levels of prediction by utilizing social influence as one of its three direct determinants of intention to use technology (Venkatesh, Morris, Davis, & Davis, 2003). In the proposed model, this result is represented in the determinant of perceived equity in using technology.

Time to invest (TI). It takes time to learn or to change (Hall & Hord, 1987). The provision of time can be seen as organizational support or facilitating conditions (Anderson, 2012; Klaus, 2006; Park, 2003). These supports or conditions, as previously identified in external controls and leadership support, are critical to the success of adoption. In the proposed model,

this result is represented in the determinant of perceived leadership support in using the technology.

Technology qualities and characteristics (TQ). Poor technology qualities as experienced in lack of stability, speed, or functionality will cause resistance to usage (DeLone & McLean, 1992; Klaus, 2006; Rogers, 1995; Suhy, 2010). Davis, Bagozzi, and Warshaw (1989) theorized that quality of the outcome of using a technology and the quality characteristics of that technology were determinants of perceived usefulness. In the proposed model, this result is represented in the determinant of perceived characteristics of the technology.

Usefulness and relative value (UR). Perceived usefulness is the most consistent, reliable, and statistically significant predictor of usage intention (Davis, Bagozzi, & Warshaw, 1989; Siegel, 2008; Venkatesh & Davis, 2000). In the proposed model, this result is represented in the continued use of a closely related determinant of perceived value of using the technology. TAM treats perceived usefulness and perceived ease of use as two distinct variables. This approach allows for comparison of relative influence of the individual variable "providing important diagnostic information" (Davis et al., 1989, p. 988). This same rationale is what underlies the TAM modification now proposed.

Conclusions

The results of the interpretational meta-synthesis indicate that technology adoption is a change process that requires leadership support in various forms. As a change process, resistance or conflict is likely. As such, constructive conflict resolution along with interventions is needed if full adoption is to be reached. Prediction of adoption intention is best provided by specific determinants unmoderated by variables. This results in the adoption model being less parsimonious than TAM but significantly more predictive and instructive to intervention

determination. Since adoption is a process, assessment is undertaken regularly to determine what current perceptions are held by those impacted by the technology. It cannot be a one-time assessment but a regular activity in understanding the current state and effectually determining interventions to enhance and support the adoption process. Figure 7 represents a revision to TAM that removes the moderating variables of *perceived usefulness* and *perceived ease of use* and replaces them with resultant determinants. The modification also includes the addition of a change management element to which there is an explicit feedback loop and through which the assessment of current state leads to enactment of interventions.

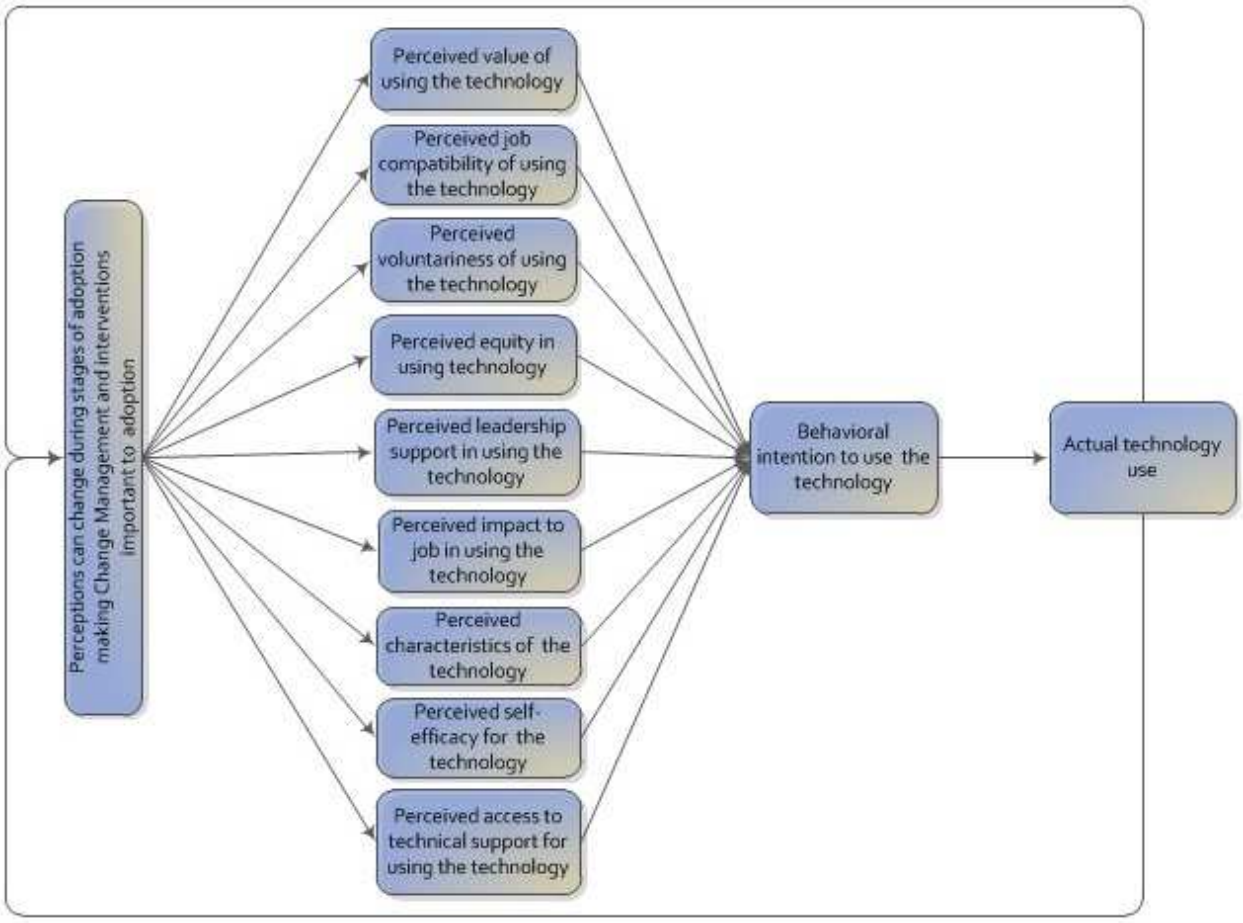

Figure 7. Modified adoption model

Recommendations

This research makes several contributions, along with suggested implications for both application and further study. First is the contribution of providing valuable insight into the general understanding of technology adoption behaviour of professionals beyond those within postsecondary education. Utilizing a qualitative meta-synthesis, the study identified influencing factors of adoption behaviour. This meta-synthesis provided a level of triangulation that enhanced the level of generalization possible while simultaneously expanding beyond what may have been discernable with a quantitative meta-synthesis approach.

The second is the conceptualization of technology adoption as dynamic change. This concept fundamentally alters the focus of technology adoption from the technology or the end-users, or the organization, to a process. It is a profound shift in point-of-action from the technology developer, under TAM, to leadership and the management of change.

The third contribution is valuable insight into the relationship of resistance to technology and conflict. Technology resistance is predominantly associated with unsuccessful technology adoption. It is usually quantified in low utilization, lack of enhanced outcomes, or even interpersonal or intergroup tension. Conflict resolution reframes resistance as a regular aspect of change and holds that it is necessary to achieving a successful, changed end state.

Fourth is the implication for practices of institutions wishing to successfully introduce a new technology. The study indicates institutions need to plan for the change that will result and actively seek to constructively resolve the conflicts that will arise. The use of a constructive change management approach will enhance the adoption process and increase ultimate utilization.

Fifth is the implication for practices of organizational leadership wishing to successfully introduce a new technology. This study provided insight into the critical nature of the leadership's role in the process of adoption. Resources are required to provide organization support to change, but there is also the actual presence of the organizational leader(s). The social influence of the leader should not be underestimated. Leadership needs to be perceived as personally supporting and active in the technology adoption.

Finally, the research provides a foundation upon which further research can be built. It creates opportunity to further develop and evaluate the theorized model. The identification, development, and validation of questions aligned to each of the suggested determinants could be undertaken. The questions, along with the model, could then be evaluated utilizing longitudinal case studies, much as has been done with TAM.

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