ABSTRACT

Utilizing in-depth interviews, this research study examined the lived experience of ten School District 33 Chilliwack secondary teachers’ technology acceptance, adoption, and levels of innovation. A questionnaire surveyed 34 teachers and provided a mixture of descriptive statistical quantitative data establishing the context for further investigation in the interview process. Interviews with the ten teachers provided a deeper understanding of behavioural intention, use behaviour, teachers’ beliefs, values and attitudes about technology, and teachers’ perceived supportive/inhibitive normative and subjective components within the contextual environment. Created for this study’s data analysis and to illustrate study findings, the concentric rings of the Transformational Technology Innovation Process model explains the interplay of transformational technology as an agent of change, constructs of the contextual environment, and teacher acceptance and adoption of technology. Finally, this study provides recommendations to enhance teachers’ adoption and levels of innovation through a planned process of organizational change resulting in educational reform.

Keywords: diffusion of innovation, educational reform, technology acceptance, technology adoption, transformational technology
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CHAPTER ONE: STUDY BACKGROUND

Introduction

On a pan-Canadian scale, the education system is poised for a potential pedagogical shift. In the evolving educational frameworks, digital literacy and competencies are not only essential for learner engagement but also for the skills and knowledge demanded by the digital era and evolving global social and economic realities. Provincial and national aspirations of governments provide a basis for potential changes to the education system; as well, they identify potential challenges that must be overcome. Integration of educational technology is emphasized as a key factor in education system transformation (British Columbia, 2011a; British Columbia, 2012; C21 Canada, 2012). There is a shared responsibility and agency, the capacity to exert power, by educational stakeholders related to the use of educational technology. Surry and Ely (2007) asserted that, “understanding why people use educational technology and, perhaps more importantly, why they don’t, is at the core of the process” (p. 107). This study gathered data on School District #33 Chilliwack (SD33) secondary teachers’ acceptance and adoption of technology and the determinants/factors that supported or inhibited their attitudes and behaviours. This chapter introduces the concept of educational reform, and subsequently it provides an overview of the educational landscape, and research questions, as well as identifies limitations and delimitations.

Educational Reform

Educational reform, a historical and cyclical process, is evident in 21st century learning. As opposed to the teacher-centred, didactic traditional approach to education, in the 1890s, John Dewey proposed pragmatic education reforms infused with the concept; education is a
continuous extension of society. Guided by teachers’ resources, he proposed that students should engage in self-directed learning in collaboration with others as active members of the community (Field, 2005, “Ethical and Social Theory” section, para. 7). The relentless debate between ‘traditional’ and ‘progressive’ education persists with the latest iteration of progressive education reform in Canada focused on embracing transformational technology and prioritizing the needs and purpose of education for the individual. With a basis in social constructivism, connectivism, and collaboration, the 21st century progressive education model utilizes emerging technologies within a global interdisciplinary model. This model is focused on making knowledge through real-world, interactive and project-based activities to prepare students for the unforeseeable and unknown future (21st Century Schools, 2008; Bender, 2012; Fadel & Trilling, 2009; Ministry of Education, 2010; Naylor, n.d.; Schleicher, 2011; Siemens, 2004; Wesch, 2008). Skillful integration of technology in order to meet learning outcomes is required for the success of this education reform. With educational reform comes the ongoing evolution in the role of the teacher.

**Changing role of the teacher**

Teachers’ roles are complex evolving along side and in response to a dynamic educational system. Many of Carr-Chellman’s (2000) study respondents “were attached to the role of the teacher as they had experienced it as students; they want to teach as they were taught” (p.103); despite this, as Fairbanks (2013) stated, “many teachers are witnessing a simultaneous change in their roles…some see it as simply traditional teaching in disguise, but others describe a seismic shift – from being the lone purveyor of information to assuming a new role of facilitator, coach, and guide” (p. S4). Hattie (2012) refers to the role of teacher as “activator” (Chapter 5
Starting the lesson, Teachers as evaluators and activators, para. 1), a notion which “has action, agency, and augmentation”, as well as “evaluator [with a focus on the] worth and merit of the activation” (para. 1). In these roles, the focus is on the teacher’s effect size on the outcome of student learning and subsequently whether “optimal teaching methods” (para. 2) were utilized. Hattie goes on to discuss technology in particular, referring to Fullan’s (as cited in Hattie, 2012, Chapter 9 Mind frames of teachers, school leaders, and systems, A model for systems, para. 6-7) work in which he identified four drivers of change in culture of education included “going all out to power new teaching innovations with technology” (para. 7). As Houston (2009) pointed out, “throughout history, teachers and teaching have tended to reflect the culture and needs of society” (p. 15). Change in teacher roles, broadly implemented in the education setting requires “teachers’ conceptions of themselves in relationship to the educational system…to change” (Carr-Chellman, 2000, p. 103). As such, it is important to understand the educational landscape within which these changes must occur.

**Education’s Digital Landscape**

In considering the topic of the proposed study, an environmental scan of the educational landscape and the future of education were necessary in order to situate the study. At a national level, an education department does not exist as the Canadian *Constitution Act*, 1867 and continuing with the *Constitution Act*, 1982. In the current Constitutional Act (1982) provincial legislatures were granted the power to “exclusively make Laws in relation to Education” (Government of Canada, 2013b, para. 93). The only two education domains involving the federal government are First Nations education, managed through Aboriginal Affairs and Northern Development Canada (AANDC, 2013), and rights of minority language education
guaranteed in section 23 of the Canadian Charter of Rights. In an attempt to bridge the gap between provincial education systems and create a national vision, national organizations and associations have developed, such as C21 Canada, Canadian Education Association (CEA), and Canadian School Boards Association (CSBA), which continually research, advocate for, and influence and engage with education stakeholders in the advancement of the education system. In British Columbia (BC), the School Act (British Columbia, 1996) provides a detailed account of the rights, responsibilities, and duties of stakeholders in the public education system.

**Pan-Canadian Vision for Education**

Nationally, C21 Canada is a not-for-profit organization with members including education associations such as the CEA, CSBA, and 21st Century Learning Associates along with a variety of knowledge sector businesses (C21 Canada, 2012). Provincial Ministries of Education across the country, educators, and education partners, associations, and organizations endorse, use, and support C21 Canada. This partnership developed a national framework for Canadian education systems addressing models of learning which support the competencies and skills that have been identified as critical for individuals and our societal success in this global digital era. *Shifting Minds: A 21st Century Vision of Public Education for Canada* (C21 Canada, 2012), founded on seven guiding principles (see Appendix A), is a “made-in-Canada vision and framework for 21st century education that all Canadians should aspire to offer to their learner” (p. 3). Of note in this document, is the recognition that the “advent to knowledge and digital age is fuelling profound and escalating changes in global economies and societies” (p. 4) and that the youth of today “are hard-wired to the digital landscape within which they live” (p. 4). *Shifting Minds* includes a call to action, for policy makers, principals, parents, education stakeholders,
and teachers, delineating roles and responsibilities for each. From sharing knowledge and skills with their peers, advocating for and supporting implementation of modernized learning models, methodologies, and resources, to engaging in innovative teaching practices and providing leadership, teachers are encouraged to be vocal, active leaders in instigating change (p. 12-13).

With membership including educators from across Canada and a long history dating back to 1891, the Canadian Education Association (CEA) continuously promotes and advances concepts within public education for greater teacher and student participation and to “influence educational transformation in Canada” (C21, n.d., para. 1). A survey conducted by the CEA determined that the “intellectual engagement” of our youth is abysmal, dropping from 85% in grade 5 to a low of 41% in grade 11 (CEA, 2011). Henke (2010) commented that our national success lies in equipping our students with the necessary “skills, attitudes and behaviours they will need for success in a knowledge-driven economy” (p. 5) and that technology has been utilised simply as a new way in which to deliver education that worked for previous generations. Instead, educators should consider how to utilize technology to transform the system to equip students and systems with “innovative, creative and adaptive” abilities which require educational leadership modeling the values and beliefs they want reflected back from both students and the system (Henke, 2010, p. 5).

CSBA’s membership consists of over 250 provincial school board associations from across Canada, including the British Columbia School Trustees’ Association, and supports Shifting Minds (C21 Canada, 2012). Created in 1923, the association’s founding members recognized the need for a national educational forum. The association acts as a national support and advocate for grassroots level of schools and communities, establishes high standards for
leadership through school boards, provides guidance and debate regarding programs and practices, and are keenly focused on student success. Although there is limited reference to technology in education within CSBA’s website, there are several references/articles to examples of best practices engaged in by School Board members and their related schools and communities (CSBA, 2011a; CSBA, 2011b; CSBA, n.d.). CSBA embraces the definition of digital citizenship as “a concept which helps school communities to understand what students should know, in order to use technology appropriately. “Digital citizenship is a way to prepare students for a society full of technology” (digitalcitizenship.net as cited in CSBA, 2011a). CSBA recognizes that “Canadian students are the world’s citizens, with the potential to make quality contributions to a constantly adapting, fast-changing global economy. Public education must prepare them to meet this challenge” (CSBA, n.d., para. 4).

Clearly, while a mandated national educational and technology integration plan does not exist, the numerous pan-Canadian organizations and associations’ support for discussion, sharing of research and information, as well as proposed strategies for setting standards and transforming education are evidence of interest for national collaborative relationships.

**Provincial Landscape**

The BC Ministry of Education (2011a) launched the five year *Education Plan* in which technology plays a significant role in implementing 21st Century learning theories and practices by:

- “Improved access to digital tools and resources that support face-to-face and online learning”
- “Promote the use of technology for both students and educators”
New “telecommunication services…will allow for improved access to the Internet”

“An improved provincial student information and reporting system will help teachers plan a more personalized experience with students and their parents.” (p. 7)

Furthermore, the 2012/2013 Transformation +Technology Update (TTU) (British Columbia, 2012), 2013/2014 Transformation Plan (TP) (British Columbia, 2013), and A Vision for 21st Century Education (Premier’s Technology Council, 2010) align with and support all five pillars of the Education Plan (British Columbia, 2011) with a particular focus on the fifth pillar, “Learning Empowered by Technology” (p. 5).

**BC Education Plan.** In 2011, the BC Ministry of Education published The BC Education Plan (British Columbia, 2011a) stating, “The world has changed…the way we educate our children should too” (British Columbia, 2011b). In response to the advances in technology and an ever evolving social and economic global environment, the Plan’s foundational pillars are built upon five key elements including: (1) personalized learning for every student, (2) quality teaching and learning, (3) flexibility and choice, (4) high standards, and (5) learning empowered by technology (British Columbia, 2011a, p. 5). The plan will require continued assessment and reporting rigour, commitment, communication, and flexibility of all strategic stakeholders in an evolving dynamic and adaptable education system.

**Personalized learning for every student.** In the province’s vision of personalized learning for every student, student agency requires they take an active role and accountability for their learning in student-centred, flexible, individualized programs imbued with “the core competencies, skills, and knowledge” required for success today. The plan suggests changes to curriculum will promote depth of knowledge and understanding with higher level outcomes.
rather than breadth of topic. Furthermore, “attributes of an educated citizen” will be established by education stakeholders and embedded throughout the system with the final goal of graduation (p. 5).

**Quality teaching and learning.** Relevant and effective teacher preparation programs, high professional standards, ongoing professional development, and accountability in teaching practice are keys to the *Education Plan* (British Columbia, 2011a). These are additionally supported in practice through mentorship, transparency and accountability in teacher regulation and disciplinary processes, along with performance reviews have been identified as areas for influencing quality teaching and learning (p. 5-6).

**Flexibility and choice.** In an ongoing effort to provide flexibility and choice, the province will continue to offer families choice in attending public or independent schools. Furthermore, “what, how, when and where” students learn along with an expanded credential program recognizing student learning outside the classroom will continue to broaden learning opportunities for students. At the Board of Education and District levels, flexibility in organization, resource allocation, and school calendar allows for response to individual community needs (p. 6).

**High standards.** Provincial high standards build on a foundation of a “strong core curriculum”, relevant provincial standards for student performance, and timely, “meaningful, effective and consistent manner” of reporting student progress to parents, all key elements of education. Supporting the core curriculum, performance standards, assessment tools and resources will be aligned with competencies, skills, and knowledge established as critical and relevant.
Learning empowered by technology. With 85% of BC residents connecting to the internet regularly, effective and relevant use of technology in the classroom will better prepare students for the demands of the digital world. Issues of connectivity, student information and reporting system, and access to digital tools and resources will be addressed, according to the plan, to support students and educators in empowering learning through technology (p. 7).

The Education Plan (British Columbia, 2011a) is in line with pan-Canadian reports, research, and strategies previously discussed; however, there continue to be challenges to overcome if the full extent of the plan is to be realized.

2012/2013 Transformation + Technology Update (TTU). Working in tandem with the Education Plan (British Columbia, 2011a), the TTU’s (British Columbia, 2012) primary goal is student success. 21st Century education is defined and addressed in relation to the education transformation that is currently unfolding. Key areas within the plan include online learning, technological infrastructure, establishing common goals and sharing resources and knowledge amongst all education partners. Engagement, communication, and collaboration among all invested partners are required for the plan to successfully move forward. The TTU (British Columbia, 2012) aligns and supports all five pillars of the Education Plan with a particular focus on the fifth pillar, “Learning Empowered by Technology” (British Columbia, 2011, p. 7). A survey, conducted in partnership between the Ministry of Education and BC Association of School Business Officials (BCASBQ), questioned the readiness of the education system’s technology for effective implementation of The BC Education Plan (British Columbia, 2011) and the demands on the education system in the digital landscape. It was determined there are challenges and opportunities such as “student-owned internet devices offer new options for
learning” and 90% of schools “have some wireless access…but we don’t have a common strategy that would let students use them to enhance learning at school” (British Columbia, 2012, p. 12). As well, although there are at least “140,000 student computers” in comparison to “600,000 students in BC”, computers tend to be located in computer labs; the lack of lab mobility limits the ability for technology to be used as daily tools in classrooms (p. 12). In addition, the age of computer systems was raised as an issue.

### 2013/2014 Transformation Plan.

An annual report following up the TTU (British Columbia, 2012), the Transformation Plan (TP) (British Columbia, 2013) provides an ongoing discussion of Ministry of Education and educational system reform, plan implementation, opportunities to be seized and challenges requiring mitigation. In relation to schools, the TP reports that demands on the Provincial Learning Network (PLNet), the secure network connection utilised by 1,700 schools across BC, are growing by 30% per year; additionally, “more than 25% of schools have less network capacity than an average B.C. household, and are unable to support the increase in digital content” (Premier’s Technology Council, 2010, p. 28-29). Implementing a new network, a major initiative as set out in the TELUS Agreement, will take several years to implement (p. 29). The Ministry of Education also identified labour relations as a challenge due to the teacher labour dispute of 2011/2012 (p. 3); however, the Ministry did engage with select teachers who opted to continue to work with them to keep the plan on track. Throughout the TP, the Ministry recognizes that consultation, collaboration and engagement of teachers are required as is provision of services, information, and training tailored to their unique needs for the success of the plan implementation. From a teacher’s perspective,
the TP lacks specifics as to their role and responsibilities in the implementation and how they will be supported and trained.

Premier’s Technology Council: A Vision for 21st Century Education. Established in 2001, the Premier’s Technology Council (PTC) was established in order to conduct research and provide advice to the Premier on technology-related issues. In consultation with industry, academia, representatives within the education system including teachers, administrators, as well as the Ministry of Education, the PTC completed extensive research and developed A Vision for 21st Century Education (2010) (Premier’s Technology Council, 2010) report. This report provides a view of the changing global demands and the need for education system transformation focused on the skills and tools required for learning in a knowledge-based society. It describes the characteristics of flexibility, accessibility, blended online and face-to-face learning, integration of technology for collaborative and individualized learning and greater access to information, as well as continuous feedback and assessment focused on improving learning outcomes (p. 3). Transformed, the new system model “will be more collaborative and inclusive, changing the roles of the student, the teacher, and the parent” (p. 24). The PTC recognizes teachers as “the core of any education system” (p. 26); however, the new model transforms the teacher from the “primary source of information and direction to acting as a coordinator of purposeful activity that matches student learning needs with available resources, thereby promoting self-directed learning behaviour” (Apple Classrooms of Tomorrow as cited in PTC, 2010, p. 26). Continuous advances in technology will provide the needed leverage for transformation of the education system. The PTC also determined that transformation from the
operational perspective is lacking and as such “operational inertia within the system hinders the ability to change” (p. 26).

**Statement of the Problem**

Technology is embedded in society. The digital generation view web browsing, instant messaging, and the Internet as a “basic part of their everyday lives” (Roberts, 2005, p. 3.2) which speaks to the speed with which a once thought of as transformative technology becomes an expected and ordinary element within the educational landscape. *Shifting Minds: A 21st Century Vision of Public Education for Canada* (C21 Canada, 2012), recognizes that “the advent of the knowledge and digital age is fuelling profound and escalating changes in global economies and societies” (p. 4) and that the youth of today “are hard-wired to the digital landscape within which they live” (p. 4). Research proposes integration of technology may not only improve student achievement but also their attitudes towards learning and school (Tamin, Bernard, Borokhovski, Abrami, & Schmid, 2011; Martindale, Pearson, Curda & Pilcher, 2005; Kulik, 2003). Molenda (2008) stated that “media and technology can be viewed as being integrated into instruction when they are woven into the fabric of the curriculum in a seamless way, as opposed to simple occasional use” (p. 156). It is not just the use of technology rather it is how it is utilised in “fostering creative and innovative minds” (C21 Canada, 2012, p. 5) that is key in the “digital learning environments” which “are prerequisites to 21st Century models of learning” (p. 6). However, potential challenges have been identified that may inhibit technology integration in BC.

In considering the increasing lack of student engagement, as evidenced by the CEA study, learning theories and models, as proposed by the *Education Plan* (British Columbia,
2011a) and Shifting Minds (C21 Canada, 2012), are intended to provide guidance in the evolution of the education systems in BC and Canada. The study completed in partnership between the Ministry of Education and BC Association of School Business Officials (BCASBQ) identified challenges due to a lack of a unified plan for implementation and technology accessibility. A further consideration was that integration of technology in the classroom requires teacher acceptance and effective use of technology.

Research has discovered that frequent, meaningful and effective integration of technology is atypical (Wozney, Venkatesh, & Abrami, 2006; Becker, 2006; Zhao & Frank, 2003). Therefore, this study sought to understand the lived experience of ten teachers in SD33. Survey responses of 34 teachers were utilized to establish a basis of understanding and determined areas for further in-depth exploration and analysis. Pragmatic to poignant interviews with the ten participants revealed catalysts in relation to the teachers’ acceptance of technology and the contextual environment factors that influence the level of technology adoption and innovation in teaching and learning practices.

**Significance of Study**

This research may enhance the secondary teachers’ culture of teaching in relation to current teacher practices in the use of technology in education’s digital landscape. Based on the professional lived experience of the ten teachers interviewed, research results and recommendations were intended to inform Chilliwack, BC educational stakeholders through the revealed correlation/implementation of the Education Plan (British Columbia, 2011), 2012/2013 Transformation +Technology Update (British Columbia, 2012), Transformation Plan (British Columbia, 2013), and the Premier’s Technology Council Report (Premier’s Technology Council,
2010) and challenges experienced along with potential mitigation strategies in practice at the time concluding with recommended strategies. In seeking information, experiences, and feedback directly from teachers, those who are required to implement educational plans, strategies, and policies, discussions of best practices are to be shared throughout the teacher professional learning community. As such, this research may have the potential to influence policy and teaching practice.

**Limitations & Delimitations**

**Scope of Study**

This study focused on and was limited to acceptance of technology and adoption in current teaching practices in School District #33 Chilliwack, BC public grades 10-12 classrooms. Participants had the option of completing an anonymous online or paper-based survey, all selected online, which was utilised to gather quantitative data for descriptive statistical analysis as well as qualitative data. All SD33 grade 10-12 teachers who expressed an interest in participating received a link to the online survey via the secure School District email system. Providing options in survey methods was intended to mitigate the challenge of teachers’ technology comfort levels which may have inhibited participation rates. Qualitative data was gathered through in-depth semi-structured interviews.

**Educational Environment Challenge**

A significant challenge to participation existed due to the local work environment which was politically charged due to contract negotiations between teachers and the Provincial Government. The strained relationship may have had a negative effect on teachers’ willingness to participate; participant recruitment was difficult and thereby limited survey and in-depth
interview participation. Furthermore, attitudes towards the research study or shared during the study may have been affected by local tensions and strained relations and thereby may have affected the results of the study.

**Ethical Considerations**

This project required a number of steps be taken to acquire permission to engage in the study. SD33’s policy required a letter of permission be completed by participating teachers (see Appendix B & C), a letter or certificate of approval from RRU’s ethical review committee, a written statement or letter of approval from the thesis supervisor, and a copy of the research instrument (in this case, the survey and in-depth interview guide) (K. Miki, personal communication, June 3, 2013). Upon completion of the project, the research findings and recommendations were submitted to the Superintendent of SD33, Evelyn Novak, and made available to all participants.

**Researcher’s Bias & Influence**

Confidentiality of participants during the data collection process aided in mitigating biases of participants and pressure to provide politically correct responses with regard to currently desirable teaching practices. As I studied those that are part of my profession and a topic which I have a vested interest, a potential conflict of interest may have seemed to exist; however, as a SD33 public school grade 10-12 teacher I was not in a position of official authority over the participants. Additionally, there was no perceived authority as all relationships I have established amongst teachers in SD33 have been as a peer. As well, I have never held a position that had influence or control over another teacher’s career in SD33 such as lead teacher, union representative, or department head. In adherence to TCPS2, mitigation begins with disclosure of
the potential conflict of interest (Panel on Research Ethics, 2012, para. 3); therefore, participants were informed of my identity, my position within the school district, and their right to choose to participate or not. Furthermore, transparency of data collected included sharing raw data with the thesis supervisor and an objective in vivo coding (Kelle, 1997, para. 5.8) was employed through the use of ATLAS.ti (ATLAS.ti Scientific Software Development GmbH, 2014) research software which utilized participants own words to develop the coding scheme.

Central Research Question and Objectives

Digital literacy and competency are essential for learner engagement and preparation for the demands of the evolving global social and economic realities of the digital era. Provincial and national visions provide a basis for potential changes to the education system, as well as, identify potential challenges that must be overcome. This study sought to discover SD33 secondary teachers’ current incorporation of technology into teaching practices. The intention was to provide a voice for teachers focused on behavioural intention, use behaviour, perceived behavioural control and perceived external control. As well, this study sought to provide District Administration with an understanding of current practice for a selection of secondary teachers, as well as challenges and limitations to further integration of technology. Specifically, this study sought to answer the questions:

Central Question. Are grade 10-12 teachers in School District #33 Chilliwack accepting and adopting technology in their teaching practice and if so, what personal, institutional, systemic, and/or community factors impede or support their acceptance and adoption, or desired adoption, of technology in innovative teaching practices?
Sub-questions.

1. What are SD33 secondary teachers’ values and beliefs about technology and its integration into teaching practice?

2. What are SD33 secondary teachers’ perceived capabilities of technology use in teaching practice?

3. How do SD33 secondary teachers’ attitudes towards technology affect acceptance and adoption of technology into teaching practices?

4. What are SD33 secondary teachers’ perceived responsibilities and expectations regarding the integration of technology?

Answering such questions provided an understanding of a sample of SD33 secondary teachers’ level of acceptance and use of technology in their teaching practice.
CHAPTER TWO: LITERATURE REVIEW

Introduction

Chapter One provided an overview of the education system and the proposed transformational plans. In order to further situate the study, Chapter Two builds on the system overview and plans through a discussion of digital literacy demands of a knowledge-based digital era and the digital generation as well as the complex process of change management in education. Reviewing a variety of theories and research, connections are made between individuals’ values, beliefs, self-efficacy, and behaviour. These theories form the basis for the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) and the Levels of Teaching Innovation (LoTI) (Moersch, 2010) which provide the framework through which the data gathered for this study was analysed. Furthermore, this chapter identifies limitations in current research and proposes areas for further research.

The Digital Era

Digital Literacy

Literacy has taken on a new meaning in this digital landscape requiring engagement, self-direction, creativity, active participation, empowerment and more. Borders and boundaries are moot in the evolution of the global digital citizen as digital media enables “communication, collaboration, dialogue, and debate on a scale never before seen and across all levels of society” (Jukes, McCain, & Crockett, 2010, p. 80). The digital generation have developed a different set of skills which educators need to value and build upon (p. 16). Literacy has always been a focus of the education system; however, continuous evolution of the digital landscape requires acquisition of new skills and literacies (Hockley, 2012, p. 108). The values, inquiry, research,
collaboration, presentation, and reflection, have not changed but opportunity for independent and interdependent development potential differs through the leveraging of technology (Chase & Laufenberg, 2011, p. 537). Critical thinking skills are essential to digital literacy rather than simply technical proficiency with technological tools (Steeves, 2012, p. 22).

Media Awareness Network (2010) warns Canada is falling behind in digital skills as we lack a national strategy to invest in technology and infrastructure or skills and knowledge required resulting in a decline in our digital economy performance. Growing up in this digital era, our youth are developing digital literacy, a comprehensive and complex set of skills through which to “use technology and communication tools to access, manage, integrate, analyse and evaluate information, construct new knowledge, create and communicate with others” (British Columbia, n.d., para. 4). However, simply having access to technology does not result in improved learning, thus students require teachers to teach critical thinking skills to effectively analyse, evaluate, and utilize technology, tools, resources, and digital information (Steeves, 2012).

**Digital Generation/Digital Natives**

The world in which students are growing up today is different from that of previous generations as they are connected in the media-rich world from the time they are born. Technology has altered global, social, and economic demands and within this evolving contextual environment, students learning styles and preferences are changing (Jukes, McCain, & Crockett, 2010). As proposed by Small and Vorgon (2008), the digital generation is “neurologically” wired in a different way from previous generations due to growing up in a highly connected world using media and communication technology. The digital generation
have assimilated technologies as part of everyday life; however, this characteristic is not as evident in school in comparison to their lives outside of school (Harwood & Asal, 2007; Cisco, 2008). Cisco (2008) found teens spent 16% of their time in 1998 and 40% of their time in 2007 on cell phones, the Internet, and games or gaming or stand-alone devices. “For many learners, class is the only time in their day when they completely disconnect” (p. 5). Jukes, McCain, and Crockett (2010) have argued that, having developed “hypertext/hyperlinked minds” (p. 19) when processing information, the digital generation does so in a “parallel or simultaneous manner, not sequential” (p.19) and they “operate at twitch speed” (p. 36). Additionally, Jukes, McCain, and Crockett (2010) also suggested that there is a growing disconnect between non-digital teachers and the digital generation (p. 47-49).

Conversely, Bennett, Maton and Kervin (as cited in Hockley, 2011) contended evidence is lacking that the generations that grew up or are growing up with technology have an appreciably divergent learning style in comparison to previous generations (p. 322). Importantly, age does not necessarily determine effective use of technology; as such, one cannot assume young learners are digitally literate nor are older students or generations digitally illiterate (Hockley, 2011, p. 322-324). Prensky (2009a), in deconstructing his digital native and digital immigrant constructs, suggested that moving forward in the 21st century, technology use alone does not equate to digital wisdom. Rather, it is the enhancement of our natural capabilities through the “prudent” (para. 2) use of technology within the context of human s’ capacity for “intuition, good judgment, problem-solving abilities, and a clear moral compass” (para. 2) that will make us digitally wise. Prensky (2009b), recognizing digital enhancement’s “potential harm
as well as its benefits” (para. 3) called to action students and teachers, amongst others, to embrace digital wisdom and assist others in doing so as well.

With controversy in how technology has altered newer generations, additional research is required to gain greater understanding and establish concrete evidence as to the benefits or detriments of technology and the role it can or should play in the education system. Technology is shaping the digital era and the resultant creation of the digital generation while reshaping how the current and future generations of learners will be taught; this is a central educational system challenge requiring understanding of acceptance and use behaviour in order to embark upon organizational change which begins with effective change management leadership.

**Theoretical Framework**

**Organizational Change**

Organizational change is a well-researched diverse field with a variety of theories yet they often share common elements including leadership, vision and purpose, design, training, implementation, overcoming barriers, and continued enhancement (Fullan, 2001; Hall & Hord, 2001; Reeves, 2009). Lewin (1951), considered the father of social psychology, introduced a three-stage process which suggested the requirement of interrupting the status quo, the ‘unfreezing’ of social norms, was necessary during the first stage. It is about preparing for change, realizing change is necessary, readying to move beyond the comfort zone motivated by increasing discomfort and evidence of need for change (Connelly, 2014a, para. 1-3). During the second stage, ‘change’ or ‘transition’, there may be a sense of uneasiness and even fear (para. 1-3); however, as Lewin (1951) discussed, change is a process rather than an event. Support is crucial; answering the ‘why’ and the ‘what’ questions through a definitive explanation of the
benefits for the change and providing a well-defined picture of the desired change respectively. In the third stage, ‘freezing’ or ‘refreezing’, the organization establishes stability once more and individuals become comfortable over time accepting changes as the new norm (Lewin, 1951).

As Connelly noted, demands of today means there is “no time to settle into comfortable routines” (Connelly, 2014b, para. 3); rather, it is an ongoing process requiring flexibility, unfreezing, changing, and refreezing. Organizational change within educational systems is a complex process facing unique challenges.

**Change management in education.** A multi-faceted process involving innumerable stakeholders, educational change requires a clear vision by leadership and solutions to complex problems that are contributing to the continuance of the status quo rather than the shift to the desired change. Du Toit and Forlin (as cited in Porter, 2012) determined that transformation in culture is the key to real change, that is, the “cultivation of a total learning environment” (p. 2). Yet, through his research, Porter (2012) determined that literature focused on change management in education had “a very heavy emphasis and focus on addressing school budget analysis, faculty and staffing, and diffusion of school system policies” (p. 14). With the complexity of challenges facing educational reform, change may be seen as a threat; however, greater support is gained when a leader clearly communicates genuine concern and regard for those in the school system including administrators, teachers, and support staff (Fullan, 2001; Hall & Hord, 2001). Hall and Hord (2001) proffered 12 principles among which they discussed change does not happen until the individuals within the system change. They went on to explain that all participants must change their thinking which requires trust between them. A clear vision as well as necessary support in infrastructure and resources must be provided leading to change
facilitated through a team effort (Hall & Hord, 2001). Therefore, educational change management success relies on the beliefs, values, and attitudes of the individual, a shared vision about teaching, learning and technology is required including a clear image of change manifested in schools and classrooms, and a collaborative effort to implement, support, and maintain the change. Change management in education requires further research and as such, this study sought to gain greater understanding of SD33’s contextual environment and the role of change management in the education system’s culture through the lived experience of ten teachers’ technology acceptance and innovation.

**Acceptance & Innovation Rooted in Social Psychology Theory**

Within the field of social psychology, behavioural intention theories have been established and evolved as a way in which to predict and/or explain an individual’s intention to perform certain behaviour. Furthermore, expectancy value theories (Atkinson, 1957; Edwards, 1954; Fishbein & Ajzen, 1975; Rotter, 1954; Tolman, 1932) and self-efficacy theories (Bandura, 1977a; Marakas, Yi & Johnson, 1998) have been formulated in order to explain overt behaviour. Additionally, Rogers’ *Diffusion of Innovations* theory is a foundational theory in the adoption of innovations. In combination, these theories and the limitations were the impetus for further development of the theory of planned behaviour (Ajzen, 1991) and a significant basis for the *Technology Acceptance Model* (TAM) (Davis, Bagozzi, & Warshaw, 1989), the *Levels of Technology Implementation* (Moersch, 1995) and its most current iteration, the *Levels of Teaching Innovation* (LoTI) model (Moersch, 2010). This section provides a review of these foundational theories followed by an overview of the TAM and LoTI, which together form the theoretical framework for this study.
Foundational Theories

**Expectancy-value Theory.** Expectancy-value theory (Fishbein & Ajzen, 1975; Wigfield, 1994; Zogheib, 2005) proposes an individual’s intention to engage in a specific activity/behaviour is a function of two variables, beliefs and values. Firstly, similar to Bandura’s (1977a) self-efficacy theory in which an individual’s belief in their capabilities affects choice of activities, coping efforts, as well as length of time they will expend effort in a particular activity, expectancy-value theory proposes an individual must believe they will be successful in their performance of a given task/activity/behaviour. Secondly, an individual must believe it is beneficial to perform the task/activity or engage in a particular behaviour. Perceived value and success expectancy are viewed as key factors in motivational frameworks, in other words, an individual’s behavioural intentions are influenced by their belief they can be successful at the task and whether they value the task (Fishbein & Ajzen, 1975; Wigfield, 1994). In conducting their study, Wozney, Venkatesh, and Abrami (2006) found that teachers’ perceived value and expectancy for success were the primary factors accounting for computer use levels and that those that believed teaching is greatly enhanced by technology tended to be innovative in their teaching with technology.

**Computer Self-Efficacy Theory.** Linked to social learning theory (Bandura, 1977b) and self-efficacy theory (Bandura, 1977a), computer self-efficacy (CSE) theory specifically refers to an individual’s perceived computer capabilities (Marakas, Yi & Johnson, 1998; Compeau & Higgins, 1995; Celik & Yesilyurt, 2013) and directly affects an individual’s interest in and desire to use computers (Gurcan as cited in Celik & Yesilyurt, 2013, p. 149). As well, CSE is related to an individual’s efforts when faced with a challenging computer-related task and their
determination to overcome the difficulties (Compeau & Higgins, 1995; Celik & Yesilyurt, 2013). Contextual characteristics, such as task and technology, as well as the individual’s characteristics, such as past experiences must be considered in defining computer self-efficacy (McFarland & Hamilton, 2006, p. 431).

Currently, use of technology for administrative tasks outweighs instructional use in teaching practices which is partly dictated by grade level, age of teacher, level of teaching experience and access (Harwood & Asal, 2007, pp. 128-129). Positive attitudes toward technology and CSE significantly influence teachers adopting technology opportunities and computer use in the classroom (Holden & Rada, 2011; Aypay, Celik, Aypay, 2012); thus, if a person has high CSE they will believe they will be successful, if their CSE is low then they will believe they will have difficulty. Improving CSE & developing positive attitudes can result in increased technology usage in classrooms. Aypay, Celik, and Aypay (2012) determined perceived usefulness had the largest effect on behavioural intention to use computers and that the easier the technology was to use, perceived positive usage increased which resulted in the likelihood of increased usage (p. 270). Therefore, CSE plays a role in planned behaviour.

**Theory of Planned Behaviour.** In this theory, an individual’s behaviour is compelled by behavioural intentions which are a function of three independent constructs: attitude towards behaviour (AB personal component), subjective norm (SN the motivation to comply as a normative component), and perceived behavioral control (PBC, the contextual component) (Ajzen, 1985; Lee, Cerreto & Lee, 2010; Sugar, Cawley & Fine, 2005). An individual’s beliefs about the consequences that may arise from a specific behaviour, and the desirability of the consequence, determine whether feelings are positive or negative about performing the specific
behaviour. Feelings consequently define an individual’s AB. An individual’s perception of whether relationally important people feel the behaviour should be performed and the situational motivation to comply with those wishes define the SN. An individual’s perception of the difficulty to perform the behaviour, a continuum ranging from easily performed behaviour to considerable effort, resources, support and such, defines behavioral control. All three determinants, AB, SN, and PBC, are significant predictors of behaviour, however, attitude is the greatest influence. In their study on teachers’ intentions to use technology, Lee, Cerreto, and Lee (2010) determined that “teachers must have positive attitudes about using computers to create and deliver lessons” (p. 152). Subsequent to behavioural intention, use behaviour is analysed according to the behaviour diffusion through an organization and at an individual’s level.

**Diffusion of Innovation Theory.** One cannot discuss adoption of innovation without mentioning Everett M. Rogers and his seminal work, *Diffusion of Innovations* (Rogers, 1962), a synthesis of 506 diffusion studies into a singular theory on the adoption of innovations among organizations and individuals. The theory explains how over a period of time, a behaviour, product or idea builds momentum and spreads through a specific social system/population resulting in individuals, as part of the social system, adopting the new behaviour, product, or idea. Rogers (1962) proposed a bell-curve of innovation adoption over time delineating adopter categories including innovators, early adopters, early majority, late majority, and laggards. Defining diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5), the *Diffusion of Innovation* theory incorporates aspects of the process of acceptance (knowledge and persuasion stages), behavioural intention (decision stage), and use behaviour (implementation and
confirmation stages) within a singular theory. While many studies have utilised Rogers’ theory as their theoretical framework, few have considered it in relation to instructional purposes (Isleem, 2003) despite the fact there are those that agree it is the most appropriate theory for studying technology adoption in educational environments (Sahin, 2006). However, a limitation of Diffusion of Innovation Theory is it does not take into account determinants such as social support or an individual’s resources that may influence adoption of a new behaviour, idea or product. As well, it explains the diffusion process, the individual’s adoption in relation to others within the social system, rather than focusing on the individual.

For the purpose of this study, acceptance and adoption will be explored utilising a compilation of models including Rogers’ Diffusion of Innovation and two specific to technology; TAM, which suggests that perceived usefulness and ease of use determine behavioural intention to use a system and functions as mediator of actual system use, and LoTI, a framework specifically created to analyse teacher technology adoption into teaching practices.

**TAM**

Rooted in self-efficacy (Bandura, 1977a), theory of reasoned action (Fishbein & Ajzen, 1975) based on expectancy-value theory, and similar to the theory of planned behaviour (Sugar, Cawley & Fine, 2005; Lee, Cerreto, & Lee, 2010; Ajzen, 1985), TAM assesses, at the individual level (Oliveira & Martins, 2011), the relationship between external variables, perceived usefulness and ease of use, which determine an individual’s attitude towards using technology, and behavioural intention to use (see Figure 1). Davis and his colleagues (Davis, 1989; Davis et al., 1989) determined the two primary factors are the perceived usefulness, “degree to which a
person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320), and perceived ease of use, “the degree to which a person believes that using a particular system would be free of effort” (p. 320). Initially, researchers (Davis, 1989; Mathieson, 1991; Chau, 1996) utilised TAM to consider individual computer usage of technology such as E-mail, Windows operation systems, Word processing programs and other such software while in more current studies, research has focused on mobile services and technologies, the Internet, digital libraries and e-learning (Moon & Kim, 2001; Roca, Chiu & Martinez, 2006). TAM has been found to be a reliable and valid model for predicting individuals’ technology adoption and usage behaviour; however, since its introduction, TAM has continued to evolve.

Recognizing the initial model did not account for all variations of system usage, researchers (McFarland & Hamilton, 2006; Legris, Ingham & Collerette, 2003; Venkatesh & Bala, 2008, Holden & Rada, 2011) determined additional indirect and direct determinants, contextual variables, and self-efficacy may affect system usage and therefore account for the usage variances. McFarland and Hamilton (2006) added contextual specificity to TAM to

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illustrate that technology usage was affected by organizational support, the quality of the system to be used, others’ use of the system, the task structure, and an individual’s prior experience and anxiety level in relation to use. In 2000, Venkatesh and Davis created TAM2 to include social influences and in 2008, Venkatesh and Bala introduced TAM3 identifying and proposing determinants and their relationships; such as, interests and incentives had an effect on perceived job relevance, perceived usefulness, and quality output (Venkatesh & Bala, 2008).

Extensive studies on the TAM model and its usage in innumerable studies have revealed limitations in TAM’s methodology (Legris, Ingham & Collerette, 2003), theoretical foundation (Bagozzi, 2007) and in the variables and relationships within the model, as previously discussed (Davis, Bagozzi and Warshaw, 1989; Venkatesh & Davis, 2000; McFarland & Hamilton, 2006; Legris, Ingham & Collerette, 2003; Venkatesh 2008; Venkatesh & Bala, 2008, Holden & Rada, 2011). TAM methodology requires study participants self-report use data, a subjective measure that may be unreliable in measurement of actual use of a system (Legris, Ingham & Collerette, 2003). The intention-actual use link was questioned by Bagozzi (2007) who suggested a poor theoretical relationship exists between the constructs of TAM. He argued a person’s intention to use a system does not determine an individual’s use behaviour, rather, intention to use may be evaluated and reflected upon and a different course of action taken thus TAM may not be suitable for predicting system use. TAM has undergone continuous evolution in an effort to address these limitations and continues to be utilised extensively to explain and predict acceptance of technology.

Levels of Teaching Innovation
Developed by Moersch (1995), the LoTI conceptual framework was created to assist US school districts and staff to restructure the curriculum to “include concept/process-based instruction, authentic uses of technology, and qualitative assessment” (p. 41). The LoTI framework proposes distinct implementation levels including: (Level 0) non-use, (Level 1) awareness, (Level 2) exploration, (Level 3) infusion, (Level 4) integration, (Level 5) expansion, and (Level 6) refinement (p. 42) (see Appendix D for level descriptions). The initial iteration’s limitation lay in the speed with which technology advances. The *Levels of Technology Implementation* model characterizes each level and category often providing specific examples of technology and program implementation. For example, Level 0, non-use refers to ditto-sheet, chalkboards, and over-head projectors which are non-existent or limited in the education system today. Newer technologies, including Web 2.0 tools, such as social networking sites, blogs, wikis, project management tools and countless others, are not addressed as these began to emerge around 1999, after the development of the *Levels of Technology Implementation* Framework. Recognizing this limitation, this study utilized Moersch’s reimagined LoTI framework, *Levels of Teaching Innovation* (Moersch, 2010), to better reflect the digital age.

The *Levels of Teaching Innovation* framework “emphasizes powerful learning and teaching as well as the use of digital tools and resources in the classroom” (Moersch, 2010, p. 20) (refer to Appendix E for a complete description). While the framework of the initial iteration of LoTI (Moersch, 2010) was inspired by research coming out of Apple Classrooms of Tomorrow (ACOT), as well as the Concerns-Based Adoption Model (CBAM) which delineated changing behaviours and concerns experienced by teachers during the integration of innovations in their teaching practice, current instructional practices (CIP) and personal computer use (PCU)
models (p. 20). The new LoTI aligns with standards that have been established by the Partnership for 21st Century Skills and the National Educational Technology Standards (NETS) created by the International Society for Technology in Education. NETS focuses on student-centred, online, and project-based learning, higher-order problem solving, critical thinking, and creativity skills, highly collaborative professional models for the digital age, and preparation of students for the global job market (ISTE, 2012). Based upon Bloom’s Taxonomy, LoTI is an innovative framework focused on the intricate relationship between instruction and assessment and the effective integration of digital tools and resources utilised to promote the standards such as those set out in NETS (Mehta & Hull, 2012; Stoltzfus, 2006).

**Theoretical Framework**

A review of official Ministry of Education provincial plans and a proffered national vision provide a framework for the transformation; yet, they lack specifics on practical steps to be taken by teachers in the classroom. A study by Roberts (2005) study revealed learners desired a “balanced use of technology in the learning environment essential” with all students in the study giving the highest rating to a balanced, “50% lecturing and 50% interactive” environment (p. 3.4). The speed with which technology advances and the demand of students for their learning environment to reflect these advances may pose feasibility issues for institutions attempting to keep abreast of current instructional technology; a topic requiring further study. While extensive research has been completed on these focuses individually, there is a lack of studies that specifically analyse acceptance and adoption of technology and the related supportive and inhibitive factors in relation to teaching innovation in British Columbia at the secondary level. This study sought to utilize established theories to gain a greater understanding
of the lived experience of ten SD33 teachers and analysed the broader view incorporating both acceptance and adoption of technology.

Common conceptual threads link aspects of each of the discussed theories together. Determinants, such as an individual’s attitude, values, beliefs, and behavioural expectancy in conjunction with school, technology system, and experiential contextual factors acting as influential determinants, appear to be inexorably linked to individuals’ acceptance, adoption and use of technology. Implementation of educational transformation plans and the integration of technology require the acceptance and positive attitude of teachers which requires the provision of time, access and support. Rooted in the theories discussed, the TAM and LoTI models provided established research frameworks upon which data analysis was based for this study. The enhanced TAM3 model incorporates a comprehensive list of constructs that were utilised to characterize technology acceptance and use in education. The LoTI scale (see Appendix E) was utilised to measure the teachers’ technology use in teaching and learning practices.

Summary

The innumerable models, theories, and studies speak to the great interest in and importance of the acceptance, adoption and integration of technology, and the requisite knowledge, skills, and literacies, in the evolving education systems of this digital era. Research demonstrates the importance of teachers’ attitudes, values, beliefs, efficacy, experience, and professional development in the transformational process. Furthermore, structural and organizational determinants influence teachers’ attitudes, acceptance and integration of technology into their teaching practice. In understanding the educational environment within Canada and the plans in place in BC in conjunction with foundational theories and models, a
framework was established through which the SD33 secondary teachers’ narratives in the educational digital landscape were analysed. Despite research on acceptance as well as use of technology in education, a gap exists in the combination of these through the exploration of the relationship between technology acceptance and the level of teaching innovation and this study strove to begin the exploration and analysis in SD33.
CHAPTER THREE: METHODOLOGY

Overview

This study embarked on an inductive approach in order to engage in exploratory analysis of secondary teacher acceptance and adoption of technology into teaching practices. An inductive approach “starts with the data and tries to find patterns in the data that can then be treated as theory” (Kalof, Dan & Dietz, 2008a, p. 60). Utilizing a mixed method approach through a survey, given the option to complete online or paper-based, and semi-structured in-depth interviews, quantitative data collected provided for descriptive statistical analysis while qualitative data provided an understanding of teacher technology acceptance, as analysed through the TAM (Davis, Bagozzi, & Warshaw, 1989), and technology adoption in their teaching practice, as explored through the Levels of Teaching Innovation model (LoTI) (Moersch, 2010).

As delineated by the central and sub-questions, a major focus of this research was to understand the determinants that support, or conversely inhibit, acceptance of technology and adoption of technology in teaching practices. As well, data collected determined participants’ values, beliefs, attitudes, and perceived capabilities, responsibilities and expectations regarding the integration of technology. Through qualitative data, participants’ were given a voice, an opportunity to express feelings and concerns which provided a depth and understanding beyond the realm of quantitative data statistics. This chapter presents the study’s methodology including a description of the participant population, a review of data collection, analysis technique, an overview of the survey instrument and interview questions, and issues of confidentiality, data sharing, as well as participants’ rights.
Phases of Research

This research study was conducted in five phases. During the initial phase, I conducted a literature review to discover ways in which to identify and analyse secondary teachers’ acceptance and levels of technology adoption in their teaching practice. Research revealed numerous models of acceptance, of which TAM, and the various adaptations with the inclusion of relevant determinants, seems to be one of the most widely accepted and utilised model. Further exploration determined adoption of technology has been studied for several decades with Rogers’ *Diffusion of Innovations Theory* significantly utilised as the theoretical framework across a broad variety of disciplines. In addition, Moersch’s *Levels of Teaching Innovation* was determined to provide a leveled, categorized framework of adoption of technology specifically related to instructional practice. Phase two consisted of overseeing the collection of data via an online/paper-based survey, from SD33 secondary school teachers. Of the 167 teachers invited to participate, 34 accepted and took part in the survey process. Data collected and analysed informed the formulation of interview questions in order to provide context and greater understanding of the interviewed teachers’ lived experience. Phase three, conducted over a period of two weeks, consisted of a subset of ten of the 34 participants completing an additional in-depth semi-structured interview at the participants’ places of work at a time convenient to their schedules. Interviews were recorded and transcribed at a later date. Phase four consisted of analysing and presenting data collected in relation to the reviewed literature utilizing the Transformational Technology Innovation Process (TTIP), a model developed for the purpose of this study. Finally, phase five involved the development of recommendations for stimulating
teachers’ acceptance and adoption of technology resulting in ongoing innovative teaching practices.

**Study Participant Population**

Participants were derived from the Fraser Valley Region, east of Metro Vancouver (see Figure 2), specifically from SD33 (see Figure 3). Home to 14,000 students serviced by 1,800 support staff and teachers in programs ranging from K-12, online/distance learning, and alternate schooling programs (Chilliwack School District, 2013a, para. 1), SD33 is a large and diverse district spanning “approximately 1,825 square kilometers including the City of Chilliwack and the surrounding areas of Yarrow, Cultus Lake, Sardis, Vedder, Rosedale and Greendale” (Chilliwack School District, 2013b, para. 1). SD33’s mission statement is,

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We believe that student literacy, academic achievement and social development are fundamental to everything we do. We believe in a safe, caring, equitable, accountable and collaborative learning and working environment where it is our aim that every student becomes a graduate prepared for opportunities beyond graduation (Chilliwack School District, 2013b, para. 1).

**Population Sampling**

In order to make an informed decision about the population sampling, I considered the primary qualitative research nature of the study, feasibility of scope and accessibility to potential study populations as well as related time and expense with conducting this research. After due consideration, “purposeful sampling” (Maxwell, 2009, p. 234) was utilised and the study population sample was selected based on specific criterion, as is characteristic of this sampling method (Suri, 2011; Maxwell, 2009). Teachers were selected due to a variety of reasons: focusing on SD33 secondary teachers was a manageable population size for the time allotted for this study; the breadth of urban and rural school secondary school boundaries resulted in varied student populates and teaching experiences; the geographic accessibility allowed for face-to-face interviews to be completed in a timely manner and at a reasonable expense; my personal stake in the continuous development of the SD33 professional learning community amongst secondary teacher peers; and the opportunity to provide valuable insight to inform district administration.

Due to the differences between elementary, middle and secondary programs, structure, and possible teaching practices, purposeful sampling of secondary teachers working in the three mainstream SD33 high schools, secondary teachers in alternate education settings were excluded, resulted in a sampling selected for “typicality and relative homogeneity” (Maxwell,
With the purposeful sample focused on a subset of teachers within SD33, invitations for study participation were sent via the District/Provincial email system to the 167 grade 10-12 teachers working in the three SD33 high schools with diverse urban and rural regional school boundaries: Chilliwack Senior Secondary, Sardis Secondary, and G.W. Graham Middle-Secondary School.

**Research Methods**

**Data Collection**

Utilizing a descriptive research design (Bickman & Rog, 2009, p.15), first, primary data collection was conducted through confidential surveys, with all participants selecting the online option, an “efficient way to document the views of large groups in a short period of time” (p. 560). Of the 167 teachers invited to participate, 38 agreed initially; however, four withdrew prior to the survey and an additional two did not fully complete the survey but agreed to have the data they supplied remain as part of the study. Second, semi-structured interviews were conducted, which “reproduces a fundamental process through which knowledge about the social world is constructed in normal human interaction” (Rorty as cited in Legard, Keegan & Ward, 2003, p. 138). A sub-set of ten teachers from the 34 survey participants volunteered to take part in the interviews in which questions generated “self-report data” (Bickman & Rog, 2009, p. 20) on participants’ attitudes towards technology, behaviour in regards to usage of technology, and factors that support or impede the use of technology in their teaching practice. Confidentiality of data collection aided in mitigating potential biases of participants focused on demonstrating currently desirable teaching practices.
With approval from SD33 District Administration, the *Research Study Invitation Email* (see Appendix B) was sent directly to the teachers containing the *Research Participant Information and Consent Form* (see Appendix C) which explained the study and its purpose. Those that responded to the request were sent an email containing a link and a paper-based survey attachment, and a unique identification number. All participants chose to access the online survey via the link provided. No participants selected the paper-based survey available for download as an attachment to the email for completion and submission via interschool mail, and no participants requested a paper-based copy be sent via the inter-school mail along with an addressed envelope for submission. Survey software and unique identification numbers guaranteed each participant was limited to contributing a single survey thereby ensuring reliability of data. In order to ensure accuracy, reliability, and confidentiality of collected data, while providing convenient accessibility to participants with busy and varied work schedules, the services of Fluid Surveys, Canadian based online survey software (FluidSurveys, n.d.a, para. 1) was utilised for the initial data collection process. Those that self-selected to participate in the additional in-depth interview process were contacted individually and a mutually convenient date and time to meet was set. Triangulation of qualitative data with regards to acceptance, level of technology adoption in teaching practices, and supportive/impeditive factors assisted in increasing reliability and validity of data collected.

**Survey & Interview Instruments**

Focused on the research question, *In the fall of 2013, are grade 10-12 teachers in School District #33 Chilliwack accepting and adopting technology in their teaching practice and if so, what personal, institutional, systemic, and/or community factors impede or support their*
acceptance and adoption, or desired adoption, of technology in innovative teaching practices?, the survey (see Appendix F) and interview (see Appendix G) questions sought to gather data on participants’ values, beliefs, and attitudes about technology, discover how technology is being adopted into teaching practices, and the determinants that influence teachers’ acceptance and adoption of technology. The online survey utilized the services of FluidSurveys.com to collect quantitative information for descriptive statistical analysis in order to provide simple summaries about the data collected. A variety of question formats were utilised including qualitative open-ended questions (see survey questions 8 through 20 and interview questions 5 through 15) and close-ended quantitative questioning formats such as multiple choice (see survey questions 6 and 7), categorical (see questions 3 and 7), and numerical (see questions 1, 2 and 4).

**Surveys.** Defined as “the collection of data for the purpose of scholarly inquiry by use of a standardized questionnaire…distributed to a selected sample of respondents for self-completion” (Kuechler, 1998, pp. 178-179), surveys are a staple of social science research methods. Survey methods are utilised to describe the given population, to gather participants’ beliefs, values, attitudes, feelings, perceptions and behaviour (Kuechler, 1998; Fetterman, 2009; Sapsford, 2007). Surveys are a fairly inexpensive way in which to gather information in a short period of time across a large population, providing participants flexibility to choose time and place for completion, and standardized questions results in uniformity allowing for comparative analysis of participants (Colorado State University, n.d.). Survey limitations and challenges may include issues such as: researcher bias affecting survey development and/or survey data analysis; the survey instrument must remain unchanged during data collection; standardization of questions may result in questions that are “minimally appropriate for all respondents, possibly
missing what is most appropriate to many respondents” (Colorado State University, n.d., para. 3); and respondent cooperation (Kuechler, 1998, p. 190) and social desirability bias (Gale Global Issues in Context, 2008, para. 1). However, mitigation strategies were implemented for this study: survey instrument development was based on well-respected theories and models as discussed in the literature review; a pilot study with a select group of three teachers was conducted in order to test the survey instrument for clarity and relevancy; and participant confidentiality was ensured by unique identification numbers and protected data storage. Of note, the survey was offered both online and paper-based to ensure greater accessibility for all participants regardless of technological skills or access to a computer and the internet.

From survey data collected and through analysis, inferences were drawn about the SD33 secondary teacher population sample providing a contextual basis from which to conduct the in-depth interviews, establish topics for deeper inquiry and greater understanding of the lived experiences of the ten teachers interviewed. The survey data set served as a gateway to understanding the context of the environment for the SD33 teachers.

**Semi-Structured Interviews.** One of the most widely used and important qualitative data collection methods, extensive literature exists on the research interview method and its use in diverse disciplines (Qu & Dumay 2011; Whiting, 2008; DiCicco-Bloom & Crabtree, 2006). Semi-structured interviews are characterized by:

- the interview is scheduled in advance at a specific time,
- they are located outside of everyday event,
- organised around predetermined questions, although additional questions may emerge from discussion,
- and they last 30 minutes to several hours (Whiting, 2008; DiCicco-Bloom & Crabtree, 2006).
The interview method is criticized as “unreliable, impressionistic, and not objective” and simply determined to be casual conversations (Denzin & Lincoln as cited in Qu & Dumay, 2011, p. 239). However, semi-structured face-to-face interviews provide an added layer of meaning and comprehension through the advantage of non-verbal social cues including voice, body language and intonation of the interviewee’s voice (Opdenakker, 2006, p. 7) revealing their emotional state, attention, and interest in the topic (Irvine, Drew, & Sainsbury, 2012, p. 90-91). Horton, Macve & Struyven (2004) note flexibility of designing and refining the interview guide is the key to the semi-structured interview method outweighing the statistical analysis limitation (p. 340). The interview process provides the room for participants to express their thoughts and opinions on the given topic while allowing the interviewer to enquire further about the responses thereby allowing for greater depth of discovery and resolution of contradictions (Horton, et al, 2004, p. 340).

**Data Analysis**

**Coding scheme.** In analysing data collected through the interviews, I engaged in selective coding for patterns based on the established category and coding scheme (see Appendix H). Furthermore, qualitative data was coded according to a clearly defined “selective coding” (Kelle, 1997, para. 5.8) scheme, as well as, in vivo coding, designating participants descriptive responses as the coding scheme, in order to authentically characterize participants’ attitudes and behaviour with regards to technology. Lautenbach’s (2013) research provided an example of such methodology in practice, with participants’ “direct quotations…grouped into themes” and then “re-fined and re-written as a design principle using appropriate verbs” (para. 8) in order to accurately analyse student input into educational transformation a technology mediated module.
Both Kenan (2012), and Batchelor (2011) utilised selective and in vivo coding emphasizing the importance of validity through the use of a software analysis program such as ATLAS.ti (2014) and/or an independent coder comparison. For this study, data analysis provided insight to existing conditions for the specific group of SD33 secondary teachers. Incorporating primary source surveys within this research required approval from Royal Roads University Ethics Review Board. As well, approval was sought and granted within the public school system of SD33 as confidentiality and informed consent requirements must be adhered to in order to carry out research within the BC public K-12 education system.

**Research Ethics Issues**

**Confidentiality, Security & Retention of Information**

Data received through the Microsoft Outlook email system are transmitted through and then stored on-site on a secure SD33 server. All participants were contacted via the School Districts’/Provincial’s webmail service, Outlook Web App, part of Microsoft Office 365, which employs Secure Sockets Layer (SSL) and forms-based authentication security, this ensured secure communications between the researcher, participants and the server. In addition, data collected via FluidSurveys.com was located on a Canadian database and therefore was secured under Canadian privacy laws rather than according to US authorities and the Patriot Act. According to the privacy and confidentiality requirements of TCPS2 (Panel on Research Ethics, 2013), no identifying markers linked surveys directly to participants. Individuals received unique identification numbers for the purposes of interview data collection and inclusion of direct quotes within the study; identity and unique identification number information was maintained on separate systems previously discussed, SD33 network and webmail service. Upon
TRANSFORMATIONAL TECHNOLOGY INNOVATION PROCESS

completion of the study, ending with the final thesis submission, a thank you email with a synopsis of the completed study, if it had been requested, was sent to all study participants via the School District email system. Once the email was sent at the conclusion of the project, all emails and databases containing participants’ names and email addresses were permanently deleted. Data analysis and backup copies were secured on SD33’s intranet Skydrive network with SSL and password protection as well as administered and stored locally by the SD33 school board.

Access to Research Information

Data collected was accessible solely by the researcher and thesis supervisors, as well, a transcriber was utilised to convert the in-depth interview recordings into a written record. Identifying information of participants was stored on a separate secured server at the researcher’s place of work. Digital research data pertinent to the study was stored on a stand-alone personal laptop with virus and firewall protection; as well, raw survey data was located on Fluid Surveys which provides secure socket layer links, secure web links and email system services (FluidSurveys, n.d.). Participants were provided with a summary of the findings and recommendations upon completion of the thesis after final submission to Royal Roads University. At any point during the study, participants were permitted to withdraw and were informed of this right in the Research Participant Information and Consent Form (see Appendix C).

It is not my intention to utilize the data collected during this research for future research projects. In order to allow for currently unforeseen research projects and/or journal article
publication, the participants’ were asked during the online survey process for their consent for the researcher to use data collected for future research.

**Right & Procedure to Withdraw**

As per TCPS2 ethical requirements (Panel on Research Ethics, 2012c), participants were informed there is no obligation to participate and of their right to withdraw at any time (para. 1). Participants wishing to withdraw were not required to provide a reason for their decision. The first withdrawal notification was in the initial request for their participation with an explanation that they may withdraw at any point during the study. The second time was in the exit message at the participant’s completion of the online survey. The third and final time was at the outset of the in-depth semi-structured interview.

“Coded information” (Panel on Research Ethics, 2012d, para. 5) procedures were utilised to identify the results obtained from individual participants through provision of unique identification numbers thereby ensuring confidentiality. Upon notification from a participant that they wished to withdraw, a confirmation email was sent to ensure they wished to withdraw. The participant was thanked for taking the time to consider their participation in the study and upon receiving final confirmation, all identifying data related to the participant was deleted. Cross-referencing the participant’s name with their unique identification number, survey and/or interview data was extracted from stored data and removed from analysis.
CHAPTER FOUR: RESEARCH STUDY RESULTS

Introduction

This research project examined the acceptance and adoption of technology by SD33 secondary teachers and the influential contextual environment factors. Chapter Four provides a description of the study participants followed by a discussion of the research results. Utilizing the lock and key conceptual model Transformational Technology Innovation Process (TTIP) (see Figure 4), created for the purpose of this study, data is organized in this chapter in such a way as to establish the broader constructs through which teachers’ technology acceptance and adoption has been scaffolded. This circular model illustrates the dynamic interplay of the concentric rings

![Figure 4. Transformational Technology Innovation Process: A visual representation of SD33 Secondary Teachers' Perceptions of the Acceptance and Adoption of Technology](image-url)
and their interrelated components and constructs through the use of arrows illustrating the inward and outward flow. Technology acts as the central focal point, operating as an agent of change. Radiating out, the interdependent rings and their overarching themes, Contextual Environment and Teachers’ Acceptance & Adoption of Technology, consist of sub-themes. Chapter four presents data collected according to these themes and sub-themes primarily focused on the lived experiences of the ten interview participants supported by the survey data.

Focused on the innermost ring of the conceptual model, the first section examined teachers’ perceptions of technology as an agent of change. Understanding how teachers’ define technology in a broader context, perceptions of external control and the perceived usefulness of technology established the groundwork required for understanding their views and behaviour.

The second section examined the middle ring of the conceptual model encompassing teachers’ lived experience of the contextual environment in relation to social/cultural, organizational, and personal factors as normative and subjective components that either act as supportive or impeditive factors in the acceptance and adoption of technology into teaching practices.

Finally, the third section examined the outer ring of the conceptual model comprised of the acceptance and adoption of technology. Data on teachers’ perceived role as well as their beliefs, values, attitudes, and computer self-efficacy which influenced behavioural intentions and consequently technology use behaviour, expressed as levels of innovation in teaching practices, are presented.
Study Sample Description

Survey Participants

The targeted group included secondary teachers from School District #33 Chilliwack teaching at GW Graham Secondary, Sardis Secondary, and Chilliwack Secondary. Of the 167 teachers initially invited to participate, 38 teachers expressed interest in taking part in the survey.

Table 1

*Survey Participant Demographic Information*

<table>
<thead>
<tr>
<th>Code</th>
<th>Sub-code Description</th>
<th>Percent (N = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (n = 34)</td>
<td>20-29 years</td>
<td>11.8%</td>
</tr>
<tr>
<td></td>
<td>30-39 years</td>
<td>23.5%</td>
</tr>
<tr>
<td></td>
<td>40-49 years</td>
<td>35.3%</td>
</tr>
<tr>
<td></td>
<td>50-59 years</td>
<td>26.5%</td>
</tr>
<tr>
<td></td>
<td>60-69 years</td>
<td>2.9%</td>
</tr>
<tr>
<td>Gender (n = 34)</td>
<td>Male</td>
<td>38.2%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>61.8%</td>
</tr>
<tr>
<td>Years of Teaching Experience (n = 34)</td>
<td>1-3 Years</td>
<td>14.7%</td>
</tr>
<tr>
<td></td>
<td>4-7 Years</td>
<td>5.9%</td>
</tr>
<tr>
<td></td>
<td>8-10 Years</td>
<td>23.5%</td>
</tr>
<tr>
<td></td>
<td>11-20 Years</td>
<td>29.4%</td>
</tr>
<tr>
<td></td>
<td>21-30 Years</td>
<td>20.6%</td>
</tr>
<tr>
<td></td>
<td>31 and up</td>
<td>5.9%</td>
</tr>
<tr>
<td>Subject Area (n = 34)</td>
<td>Sciences</td>
<td>16.7%</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td>14.3%</td>
</tr>
<tr>
<td></td>
<td>Humanities</td>
<td>35.7%</td>
</tr>
<tr>
<td></td>
<td>Applied Skills</td>
<td>9.5%</td>
</tr>
<tr>
<td></td>
<td>Fine Arts</td>
<td>9.5%</td>
</tr>
<tr>
<td></td>
<td>Special Education</td>
<td>9.5%</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Education/Computers</td>
<td>4.8%</td>
</tr>
<tr>
<td>Level of Education (n = 34)</td>
<td>Bachelor</td>
<td>14.7%</td>
</tr>
<tr>
<td></td>
<td>Prof Cert.</td>
<td>11.8%</td>
</tr>
<tr>
<td></td>
<td>Post-Grad Cert.</td>
<td>26.5%</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>47.1%</td>
</tr>
</tbody>
</table>
with all electing to complete the online version. Four participants chose to withdraw from the study prior to taking the survey. Two participants did not fully complete the survey but agreed to have the questions they did complete included. Research participants were identified by unique identification numbers. Participants included 21 females and 13 males who ranged in age from 26 to 65 years old with two months to 42 years teaching experience in a breadth of courses and programs in the sciences, mathematics, humanities, applied skills, fine arts, and alternate education (see Table 1 for a participant summary and Appendix I for a detailed breakdown of individual participant demographics).

Of the 34 teachers who participated in the survey, 10 volunteered to participate in the interviews. Table 2 provides demographic information on each participant with pseudonyms provided for easier identification and referencing in the discussion of data collected.

**Interview Participants**

Table 2

<table>
<thead>
<tr>
<th>Pseudonyms (Unique Identification #)</th>
<th>Age</th>
<th>Gender</th>
<th>Years of Teaching Experience</th>
<th>Highest Level of Education</th>
<th>Subjects Taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary (2013-CT101)</td>
<td>55</td>
<td>F</td>
<td>35</td>
<td>Masters</td>
<td>Special Education</td>
</tr>
<tr>
<td>Tina (2013-CT104)</td>
<td>34</td>
<td>F</td>
<td>8</td>
<td>Bachelor Degree</td>
<td>Spanish, Planning 10, Art, Social Studies, English</td>
</tr>
<tr>
<td>Jen (2013-CT105)</td>
<td>49</td>
<td>F</td>
<td>12</td>
<td>Post-Graduate Diploma</td>
<td>Science, Alternate Education, Counselling</td>
</tr>
<tr>
<td>Sarah (2013-CT111)</td>
<td>28</td>
<td>F</td>
<td>4</td>
<td>Post-Graduate Diploma</td>
<td>English, History</td>
</tr>
<tr>
<td>Ann (2013-CT113)</td>
<td>27</td>
<td>F</td>
<td>3</td>
<td>Professional Certification</td>
<td>English, PE, Earth Science, Learning Assistance</td>
</tr>
<tr>
<td>Jess (2013-CT115)</td>
<td>42</td>
<td>F</td>
<td>15</td>
<td>Post-Graduate Diploma</td>
<td>Art</td>
</tr>
<tr>
<td>Kate (2013-CT117)</td>
<td>36</td>
<td>F</td>
<td>10</td>
<td>Bachelor Degree</td>
<td>Applied skills (Industrial Arts)</td>
</tr>
<tr>
<td>Dan (2013-CT123)</td>
<td>43</td>
<td>M</td>
<td>17</td>
<td>Masters</td>
<td>Social Studies</td>
</tr>
<tr>
<td>Chris (2013-CT133)</td>
<td>42</td>
<td>M</td>
<td>18</td>
<td>Post-Graduate Diploma</td>
<td>English, Alternate Education</td>
</tr>
<tr>
<td>Suzie (2013-CT135)</td>
<td>55</td>
<td>F</td>
<td>27</td>
<td>Masters</td>
<td>Home Economics</td>
</tr>
</tbody>
</table>
This section provides a summary of interview participants demographic information (see Table 2) followed by brief descriptions of each teacher, based upon the researcher’s observations and information provided by the teachers, in order to offer context with which to understand their perceptions, intentions, and behaviour. It provides an intangible quality to their contributions resulting in richer context for analysis.

**Mary.** Upon entering Mary’s office, her jovial spirit and sense of humour became clearly evident. Windows in her office overlooked her colourful classroom packed with resources, tools, and equipment to assist in the education and care of her students. Her office was a collection books, papers, equipment, and a variety of technology. Feet up, leaning back in her chair she regaled me with stories, peppered with bouts of laughter and big hand gestures, of her 35 year career teaching throughout British Columbia as well as the Yukon, and New South Wales in Australia. She is committed to lifelong learning having earned a BEd with a specialization in Special Education from the University of British Columbia (UBC), a graduate Diploma in Education of the Deaf from UBC and a Masters in Special Education of the blind/visually impaired from the University of Newcastle. Mary has embraced technology from her undergrad days when the computer was a massive mainframe that filled the basement of the building requiring a signed form from her professor to conduct a search, a stack of punch cards to run the ERIC search which was then printed days later when complete, to her current extensive use of technology in her personal and professional life. Mary was down-to-earth, witty, and engaging advocating the implementation of technology into education in a meaningful way.
Tina. Taking place in my office, Tina’s interview was a relaxed conversation over a meal. Her eagerness to connect with students and desire to effectively engage her students is paramount spurring her to continually explore new practices and seek out relevant professional development. In visiting her inviting classroom, elementary training and practicum experience in the primary grades is evidenced from the moment you enter through the embellished door to viewing the engaging decorative bulletin boards. Yet, Tina’s teaching contracts have all been at the high school level incorporating her specialty of Spanish often combined with an array of courses in which she has no training. A pod seating plan demonstrates the importance of collaborative learning in her classroom.

Jen. I met with Jen in her counselling office which is situated beside her alternate education classroom. Jen had a big personality, a sarcastic wit, and a pragmatic viewpoint on her role in the school and technology in education. For many years prior to becoming a teacher, Jen worked as a waitress her schedule fitting around her growing family’s needs. Subsequent to her degree completion at UBC, she was a research technician for a couple years. After 4 years of temporary teaching contracts, she earned a continuing contract with the past seven of eight years in her current school. Jen’s twelve years of experience include counselling as well as teaching science and alternate education. Jen spoke emphatically of her love for teaching and what a gift it was to come to work each day. She views technology as a useful tool for communication and engaging students; however, she identified challenges that inhibit her desire and/or ability to utilize technology in her professional practice.

Sarah. Waiting at the main office for directions to Sarah’s classroom, I observed a group of three individuals approach. The one dressed in skinny jeans, rock band t-shirt, studded belt
and high cut Doc Martens turned and said her farewells to the two others and entered the office. Upon arriving at Sarah’s door, I soon discovered it had been her that I had noticed previously. A self-ascribed English nerd in her survey, Sarah soon explained her dichotomous character of academic and comedic rock star, a combination that engages students and assists in creating connections and quickly building relationships with her students. Four years into her career, she has high expectations for her students and is intent on developing their critical thinking skills. She is reluctant to incorporate technology into her teaching practice for reasons she ardently explained.

**Ann.** Nine months pregnant at the time of the interview, Ann was beginning her maternity leave. With three years’ experience in temporary teaching contracts, Ann has taught a variety of courses including English, PE, Earth Science, and Learning Assistance. Ann’s husband is a wireless communications manager consequently she is surrounded by technology at home yet she feels she still has a lot to learn. During the interview she expressed that as a new teacher, her philosophy is still being shaped. She believes that building positive working relationships with her students was of utmost importance and through those connections she can engage the most challenging students in the class.

**Jess.** Due to an injury, Jess was on leave from her teaching position thus the interview was conducted electronically. Jess has 15 years’ experience gained in three districts throughout BC but with the majority in Chilliwack. A fine arts specialist, Jess has taught Art for grades one through 12 as well as a variety of other courses including Home Economics, Drama, and Humanities. Passionate about her subject area, Jess spoke of how this translates into the building of relationships with her students recognizing her effectiveness was hampered when she lacked
the background in subjects she was required to teach. In her interview, Jess emphasized technology is a tool essential to our daily lives but that we are tasked with the responsibility of how best to use it.

Kate. Kate’s interview took place in her office located just inside the entrance to her applied skills workshop. It was a confined space filled with books, sample projects, resources, and her computer. During her ten year career, she has worked in two school districts; however, the last eight years have been in her current school. Prior to the interview beginning, several students discussed their current situation with her provoking a firm yet motherly response compelling them to make greater efforts to make positive choices in both academic and personal situations. This and her emotional interview conversation about the state of education, engaging, supporting, and advocating for students, and the use and misuse of technology by youth illustrate her student-focused, no-nonsense, passion to guide her students in mindful application of technology at school but particularly in their personal lives.

Dan. I met with Dan in his classroom shortly after the end of the school day. Student desks were set up in a horseshoe and he referred to the centre area as his “stage” from where he directs, redirects and focuses students in a relaxed, task oriented atmosphere. A veteran teacher of seventeen years, Dan seemed confident and comfortable as we discussed his career, opinions, and experiences. With a Masters in French Literature, he spent the first seven years of his career teaching language and literature courses followed by three frustrating years teaching Social Studies in immersion with a lack of resources and the pressure of a newly introduced provincial exam. Over the years he has been involved in committees, been department head, union rep, and consultant for provincial exam development. Three years ago he decided to focus on his classes,
his students and his personal life in order to strike a better work-life balance. Open to technology and its possibilities, Dan designed and installed a stand-alone off-grid power system for his home. From his early degree education days, he embraced evolving technology including the internet and he was the first to use a digital projector at his school. Although Dan explores and utilizes a variety of technological tools and resources, during the interview, Dan made it clear he believes there is a disconnect between the provincial and school board office vision and the reality of support provided for the classroom.

**Chris.** I met with Chris in his portable during a district wide after school collaboration session. Also a 17 year veteran, his career has included time in the Langley school district, a First Nations school near Agassiz, and currently Chilliwack. His role is balanced between the alternate program in the morning and English 12 in the afternoons. As a result, he works with students with a variety of social, emotional, and personal challenges juxtaposed with highly focused academic students. He was a man of few carefully selected words requiring prompting for further explanation. Chris’ animosity towards technology, established in his survey, was further evidenced by his responses, tone of voice, and sarcastic laughter during the interview. He spoke of the highly demanding and dynamic nature of the teaching profession. Chris stressed the importance of teaching his students critical thinking skills, to expose them to ideas other than the dominant culture and question the ones they hold in order to develop a critical eye, be “conscious of other ways of looking at things and not accepting things blindly” (Chris, personal communication, November 27, 2013).

**Suzie.** With a degree in Home Economics and Secondary Education from Seattle Pacific University in Seattle, Washington, Suzie went on to earn a M.Ed. in Educational Leadership
from City University. During her 27 year career, she has taught in Saskatchewan, the
Philippines, and, for the past 20 years, throughout BC. She has contributed greatly to her field of
specialization including lending her expertise to provincial curriculum development and in her
significant role within the Teachers of Home Economics Specialist Association (THESA). Over
a lunch period, we met in her office, a small room located in her classroom; both were neat and
highly organized containing kitchen, sewing, and laundry equipment as well as several
computers, a digital projector, Apple tv, and a document camera waiting to have wiring installed.
While open to technology and integration into her teaching practices, Suzie identified several
challenges that inhibit her ability to do so in a significant and meaningful way.

Data Presentation

At the outset, I began with a central question as well as four sub-questions:

- Are grade 10-12 teachers in School District #33 Chilliwack accepting and adopting
technology in their teaching practice and if so, what personal, institutional, systemic,
and/or community factors impede or support their acceptance and adoption, or desired
adoption, of technology in innovative teaching practices?

- What are SD33 secondary teachers’ values and beliefs about technology and its
integration into teaching practice?

- What are SD33 secondary teachers’ perceived capabilities of technology use in
teaching practice?

- How do SD33 secondary teachers’ attitudes towards technology affect acceptance and
adoption of technology into teaching practices?
• What are SD33 secondary teachers’ perceived responsibilities and expectations regarding the integration of technology?

While these focused the research process, during analysis, reflection on the relationship between the literature review and data collected via interviews were further supported by survey results. Interview participants provided a personal perspective on their beliefs, values and attitudes as well as their acceptance and adoption of technology into their teaching practice. Discussions, framed by reviewed literature, are organized in three sections according to the TTIP (see Figure 4): first, perceptions of technology as agent of change, second, the contextual environment: normative and subjective components, and third, acceptance and adoption.

**Technology: Agent of Change**

Incorporating attitude towards behaviour (AB personal component), subjective norm (SN the motivation to comply as a normative component), and perceived behavioral control (PBC, the contextual component) of the theory of planned behaviour (Sugar, Cawley & Fine, 2005; Lee, Cerreto, & Lee, 2010; Ajzen, 1985) and the variables of beliefs and values of expectancy-value theory (Wigfield, 1994; Zogheib, 2005; Fishbein & Ajzen, 1975), the central ring, Technology: Agent of Change of the TTIP (see Figure 5), encompasses interview data, supported

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**Figure 5. Transformational Technology Innovation Process:**
Technology as Agent of Change
by survey data, with regards to how teachers define technology, their perceptions of external control with regards to their personal and professional usage of technology, and their perceptions on the value of technology.

**Technology defined.** Each of the interviewed teachers considered technology in general terms speaking about it in positive, neutral, and negative terms with further delineation based on use. In general terms, positive terminology was utilized by Ann, Tina, and Dan. Ann described technology as “tools used to enhance the skills of others…that can enhance the classroom environment”, while Tina spoke to the ability of technology to “aid in learning, comprehension and creation”. Dan broadly defined technology as “anything humans have invented in an attempt to make life easier”. These comments were echoed by 52.9% of all survey participants who used similar descriptors such as “helps us do a task” and “supports learning”. Neutral terminology was utilized by Sarah, Jen, and Mary who each referred to technology as a tool going on to provide examples both in and outside of the classroom environment. Sarah viewed technology “mostly in terms of electronic advances: smartphones, tablets, the internet, webcasts” while Jen included “any tool that uses machinery, computers, and/or the internet”, and Mary described it as “in general, anything involving tools” and within a classroom context as “largely electronics: cell phones, SMART Boards™, computers”. Jess expanded on this and explained technology in her subject area includes not only computers and projectors for showing students “innovations and examples from the art world” but also equipment such as the computerized kiln for firing pottery. Similarly, Kate discussed the use of “machine and hand tools used in the production of creating three dimensional project solutions” in her specialized course area. These views and examples were comparable to survey results in which 41.2% of all surveyed teachers, described technology
free of valuation terms; for example, technology is “applying scientific knowledge to our daily lives”. While Chris’ initial comment was viewed as potentially positive, “any adaptation of something occurring naturally for a novel purpose, the creation or adaptation of something synthetic for a novel purpose”, he quickly dismissed this interpretation denouncing technology in subsequent questions. Chris’ negative viewpoint was supported by one other teacher in the survey process who simply referred to it as “a Pandora’s box”.

When defining technology in terms of use, each of the teachers, except for Chris, utilized one primary descriptor of tool. While survey participants similarly referred to technology as a tool, three sub-category descriptors surfaced including learning, communication, and creative/creation tool. As a tool for learning, technology was described as “an active agent of learning” and more than a third of teachers referred to technology as a “communication device”. According to one survey participant, “at every point in history, and in the future as well, there will always be new and innovative ideas/objects/etc…, tools to deal with life’s problems and that is technology”. Having defined technology, teachers then considered locus of control.

**Perceptions of external control.** Subjective norms provide motivation to comply as normative components. As such, organizational and societal expectancy act as supportive and impeditive factors in teachers’ acceptance and adoption of technology.

**Societal expectancy.** We are in the digital age and as such, students are citizens of the world requiring the education and skills to prepare them for a constantly changing global economy (CSBA, n.d., para. 4). Interview discussions revealed teachers’ perceptions on the explicit and tacit societal expectancy surrounding technology acceptance and adoption both personally and professionally. Each of the teachers expressed concern over a variety of issues
due to societal expectancy not only for themselves but people in general. Sarah felt scared and upset of “where the entire shift is now”, a trend she identified in relation to technology in society. She questioned the “detrimental” effects on kids reporting that in her experience youth appear “caught up in all the different problems associated with their social media and their technology” yet it is inescapable as pressure, she felt, was “almost subliminally” exacting pressure to be “working at top speed” and “having the coolest thing”. Ann argued society seems to view technology as “essential” and you are left behind if you are not engaging in it and with it. Jen identified “the expectation is I need to be communicating pretty quickly and pretty effectively”. Among interviewees, Dan’s comment, “the use of technology is pervasive”, resonated with survey participants’ comments. Responding to societal expectancy, teachers’ beliefs surrounding technology emerged.

**Technology in society beliefs.** Speaking to the role of technology in society during the interviews, teachers universally iterated its prevalence with each expressing varying levels of concern for perceived detrimental effects and changes to society. An overall sense of uneasiness emerged with trepidations over loss of, as Kate described, “the written word” and as Ann explained, the “ability to interact socially”. Kate perceived a “push to plan obsolescence” coupled with being “constantly encouraged to upgrade to the latest and greatest”. Dan postulated, technology is “socialized at a very early age” while Sarah went further describing technology as “an opiate of the masses” that has “replaced religion” and “rotted everyone’s brains”. Chris was equally pessimistic believing technology is an “agent of distraction” and that “unchecked and unquestioned, it’s profoundly negative”. Anthropomorphizing technology, Dan referred to particular brands, apps, and tools as “arrogant” and “conceited” with a “sense of self-
importance”. While comments were overwhelmingly negative with a sense of or advocating for greater wariness in accepting technology and the resultant drawbacks and negative personal and social effects, nine of the ten teachers reconciled technology use accepting it as the norm, essential, even required in, as Dan described, “active citizenship”. Teachers’ concerns about technology in society were further evident in discussions regarding the role of technology in their classrooms.

*Perceived role of technology in the classroom.* In questioning interview participants on the role of technology in the classroom, a valuation continuum emerged with teachers’ assessment evenly distributed ranging from deleterious to unnecessary distraction on one end, unavoidable necessity in the middle, to an engaging tool that has benefited the teachers’ experience and execution of duties at the other end.

Sarah, Chris, and Jess viewed technology as a destructive force with Sarah believing it “makes kids dumb so that the government can control them more” and Chris was particularly emphatic that he has not “seen it used in an educationally sound way”. Jess pondered, “people can get caught up in all of the newest trends and lose focus on whether it is actually improving the classroom or just adding an extra layer of unnecessary stuff” while Chris queried “does it or should it” play a role. Sarah took a more pragmatic approach desiring a greater focus on digital literacy in order to mitigate what she referred to as “a battle we’re constantly trying to wage” with students’ appropriate use and teachers’ effective implementation of technology into their teaching practice.

Tina, Ann, and Kate, seemed resigned to accepting technology due to external pressures and expectations both organizational and societal. Tina and Ann agreed, technology is
embedded in society and have embraced what Tina referred to as a “you can’t fight it, you got to use it” attitude. Kate passionately emphasized technology could never “replace that human connection” between teacher and student. Recognizing technology is playing a role in education, Kate expressed the need for increased support financially and in training, for teachers and students alike, as well as greater understanding for the differences in how technology implementation looks like in her applied skills classroom versus an academic classroom.

Jen, Suzie, Mary and Dan focused on the beneficial role of technology with increased engagement. Suzie explained it provides new and innovative ways for students to “express their learning”. Technology, Mary insisted, can “enhance the delivery of lessons”, provide access to a wealth of resources allowing for “impromptu lesson plan adjustments” espoused Dan, with ease of access to materials online, as well as improved options for gradebooks, communication, and what Jen specifically noted as “quick and dirty assessments” utilizing her SMART Board™. These perceptions on the role of technology in the classroom were influenced by the perceived values and beliefs surrounding technology.

**Perceived value of technology.** Perceived value and belief engaging in a given behavior is beneficial are essential elements of a motivational framework (Fishbein & Ajzen, 1975; Wigfield, 1994; Zogheib, 2005). The ten interviewees’ values became evident through discussion; similar to survey participants, comments were categorized into likes and dislikes. Mary, as did Suzie, deliberated how technology can enhance “existing capabilities” and although teaching and learning can and does take place without technology, it does not happen “with the same far-reaching and immediate access”; correspondingly, 56.3% of survey teachers appreciated the potential for enhanced learning, teaching, and communication opportunities
technology afforded. Kate described “advancements in tool technology have sped up processes”. Jen, similar to Tina, Jess, and Dan, discussed the “ease and speed of access to information and communication” and what Jess described as the “potential for connecting with other like-minded individuals and sharing ideas” while Mary spoke to the breadth and depth of information available “at my fingertips”. These comments spoke to 46.9% surveyed teachers who highlighted ease of access to information due to the mobile nature of technology. Mary expounded on how technology can be utilized to “engage, differentiate and illuminate” both within the classroom and in one’s personal life, a sentiment supported by 25% of surveyed teachers. Ann welcomed how technology is “ever-changing” and “will always leave us with much to learn”, a statement that resonated with only 12.5% of the survey participants.

Supported by 62.5% of those surveyed, interviewees discussions centered on ‘dislikes’ included concerns over cost and maintenance requirements, a weighty issue for cash-strapped budgets particularly when coupled with complaints technology, as Suzie described, is “not always reliable”, a sentiment echoed in 34.4% of surveys. Feeling increased pressure and expectations to incorporate technology into their teaching practice, meaningful or not, teachers expressed dismay leaving teachers, such as Dan, frustrated with “software that is not designed to help me or my students in the pedagogical context, but driven by other considerations” or “the disconnect between what can be done, and the time it takes to learn something new well enough to use” complained Jess. A lack of training left Suzie feeling “behind” with the “extra work that it takes…twice as much”. Similar to 25% of those surveyed, Tina, Jess, Kate, Dan, and Suzie found the amount of information and the speed with which technology changes challenging. Mary expressed concern, “when people want to torment, harass, or destroy, technology can be
used to facilitate that” as well, students can access it to “opt out…instead of attending to the lesson”. Tina expressed “without appreciation being taught…it is being used as a tool to promote laziness” with students, as Ann assessed, “unable to respectfully self-regulate their use of personal devices in class”. Considering the perceived potential for misuse together with technology as a source of distraction, interviewed teachers railed against the perception that technology is, as one survey participant described, an “educational panacea”; however, Mary queried, “but that begs the question of whether our whole education system is antiquated and dysfunctional”.

Teachers’ varied definitions of technology, perceptions of external control and their values and beliefs of technology spoke to the concept of and potential for technology, acting as an agent of change, to stimulate transformation; however challenges emerged regarding its pervasiveness, locus of control, perceived value and role of technology in the classroom. This discussion required further focused analysis of the normative and subjective components of the contextual environment of the education system.

**Contextual Environment: Normative & Subjective Components**

The middle concentric ring of the TTIP (see Figure 6) consists of the contextual environment constructed by normative and subjective components. This concentric ring incorporates TAM (McFarland & Hamilton, 2006; Venkatesh & Bala, 2008) and its associated theories, organizational change theories (Connelly, 2014; Fullan, 2001; Hall & Hord, 2001; Lewin, 1951; Reeves, 2009) in addition to issues of change management in education (Porter, 2012; Fullan, 2001; Hall & Hord, 2001). The interconnectedness of the model illustrates that with technology acting as the agent of change, normative and subjective components shape the
Contextual environment of acceptance and adoption of technology. Contextual variables, organizational factors, the culture of teaching, and educational reform, acting as indirect and direct determinants, serve to prompt or inhibit technology acceptance and use in teaching practice (McFarland & Hamilton, 2006; Venkatesh & Bala, 2008).

**Organizational factors.** According to technology acceptance, adoption, and behaviour theories, organizational factors, demands/requirements, support, and culture influence teachers’ technology use (Sugar, Cawley & Fine, 2005; Lee, Cerreto, & Lee, 2010; Ajzen, 1985).

Considering factors that prompted initial use of technology, Sarah, Ann, Kate, Suzie discussed societal and organizational expectations, demands and/or requirements, similar to 34.4% of those surveyed. Mary, Tina, Jen, Jess, Dan, and Suzie to an extent, along with 21.9% of surveyed teachers, reported on the availability of technology. Additionally, 6.3% surveyed accredited observing peers engaging in use while Chris insisted the line of questioning was “not applicable”
as he does not use technology. Interviewees provided a deeper understanding of organizational factors through sharing their lived experience with regards to organizational expectancy, provincial, district, and school level, and organizational support including provision of technology.

**Organizational expectancy.** At provincial and national levels, technology is emphasized as a key factor in education system transformation (British Columbia, 2011; British Columbia, 2012; C21 Canada, 2012). This vision and the accompanying plans and policies translate to teachers in various ways. There is a common sense that, as Sarah stated, “everything’s top-down” and, as Mary described, “the suits…want us all forward thinking and ahead and clever”.

Organizational change fear and uneasiness (Connelly, 2014a, para. 1-3) can affect the outcome. Evidence of uneasiness surfaced in interview discussions in comments such as Suzie’s, “if you aren’t incorporating tech into your teaching, you’re old school or out-of-date”. Hesitancy was apparent and while most of the interviewed teachers were accepting and adopting technology into their teaching practice to some degree, organizational expectancies were viewed as a fad, an ill-fitting vision for particular courses, or an inexorable and unavoidable pressure. Time and time again, Kate emphasized technology “doesn’t always fit in with my teaching area”; a sentiment echoed by Jess who has “felt pressure to use” technology but has found that much of the hardware and software promoted “aren’t particularly useful for my subject area” therefore she has not made an effort to learn about them. A prominent sentiment amongst interviewed and surveyed teachers alike was summed up by one survey participant who stated, “I am skeptical because I know that in a year it’s going to be something new again”. Reported expectancies were coupled with organizational support provided with associated challenges.
Organizational support. Support is proffered by the provincial government, according to the Education Plan (British Columbia, 2011), in terms of connectivity and access to digital tools and resources (p. 7). The 2013/14 Transformation Plan (British Columbia, 2013) promotes the concepts of consultation, collaboration and engagement of teachers in relation to providing services, information, and relevant teacher training while A Visions for 21st Century Education (2010) supports the notion of teacher as coordinator promoting self-directed student learning behaviour (p. 26). Interviews revealed teachers’ experiences appeared to challenge the claims of these plans.

Provision of technology. Unanimously, teachers agreed a sufficient and appropriate amount of technology, both hardware and software, was provided for use in their teaching practice; it should be noted, however, Chris emphasized the school will provide “whatever I ask for, which is nothing”. Kate and Sarah discussed “budget restrictions”, concerns expressed by 32.4% surveyed, desiring a shift of allocated technology monies to tools or books better suited for their departments. With control of her budget, Mary had greater flexibility in allocating funds for technology which required shoring up via student fundraising and donations from external organizations. Only Dan, Kate, and Suzie utilized personally provided technology at times, similar to the 21.9% of those surveyed. Only one teacher, revealed during the survey process, mentioned students provided the technology. Availability of technology in conjunction with other factors seemed to positively influence usage; Mary referred to the combination of “my intrinsic characteristics such as curiosity, optimism and desire to explore, as well as the availability of the technology” while survey participants echoed this sentiment with comments such as “speed and availability of resources” and “availability, increased engagement, personal
growth”. Conversely, a common concern with the lack of availability of resources combined with risk of faulty infrastructure or unreliability of technology provided or insufficient number of computers challenging consistent accessibility diminished teachers’ usage or interest in incorporating technology into their teaching practice. Similarly, teachers raised concerns over current professional development provided.

*Professional development.* Relevant, timely, and sufficient training are desired amongst the teachers; they identified or complained about the lack of such training provided by school and district administration. Comments centred on three primary issues.

First, Kate, Jess, and Ann emphasized the lack of training relevancy to their specific subject area with meaningful outcomes that could be applied to the classroom; Jess stated “the hardware and software are available, but the actual education that is required for me to effectively use it is not really adequate”. A survey comment, “most workshops assume you want student-centered ideas and are teaching in a computer lab, I just want stuff to help improve my lessons/webpage/etc”, rang true with Kate, Jess, and Ann. Second, teachers discussed current training delivery methods involving infrequently offered, largely didactic lessons to large groups on multiple general use programs during the one session with limited, if any, hands-on practice. In rebuttal to this style, Dan, Jen, Mary, Suzie, and Tina supported Kate’s comment “I would love some small group workshops with teachers in a similar teaching situation to myself using the technology to support our discipline, and the time to do so without feeling rushed and unsure.”, and that of a survey participant who desired the “opportunity to share with others who have used technology in their classroom, to give useful tips”. Third, supported by 40.6% of the teachers surveyed, Mary, Tina, Jess, Kate, and Suzie discussed the amount or lack of time to
learn, practice and/or incorporate new technologies into their current practice. They focused on time in relation to frequency and length of learning sessions, effective and relevant practice time, and time to implement learning into teaching practice. Teachers’ level of frustration was evident with one survey participant’s analysis “in service for technology is woefully inadequate” resonating with Mary, Jess, Kate, Dan, and Suzie. In commenting specifically on frequency of training in correlation with relevancy, Suzie explained, “an hour here or there is not enough time to really work on integration or even to brainstorm ideas about where you might want to try to integrate something”. Chris, who has given up on technology altogether assessed there were, “a ridiculous number of workshops and information sessions being offered to people who haven’t worked on the actual art of teaching yet” while Sarah, out of frustration, stated how she would “rather get money for books” than technology and yet another teacher has opted out choosing to not adopt any new technology for now.

In the course of data collection, pre-service training was specifically raised by three different survey participants including Tina and Ann who discussed it in greater detail during the interview. Throughout the Simon Fraser University (SFU) and the University of the Fraser Valley (UFV) teacher education programs, these teachers were encouraged to incorporate technology into their teaching practice. Due to this, Tina remarked, “I don’t really know any other way”. Ann explained, “technology was an important part of the program’s philosophy of education…I came to understand the important role it plays in the modern classroom”. She went on to explain, “From the time I began my career, it has been an important part of my pedagogy”.

Organizational expectancies and supports, as well as additional contextual constructs, imbuéd teachers’ perceived culture of teaching and the resultant attitudes and beliefs concerning the teaching profession.

**Culture of teaching.** Demands, availability of technology, and ability to prompt others or own engagement, peer support, and previously discussed organizational constructs were some of the perceived factors shaping the culture of teaching and influencing teachers’ use of technology. Interconnectivity of the TTIP (see Figure 4) is evident in the overlap of factors within the overarching and sub-themes.

**Demands.** Technology use is engrained in our society; 85% of BC residents connect to the internet regularly (British Columbia, 2011, p. 7). As such, teachers discussed ubiquitous expectations for technological literacy in simple day-to-day living tasks such as “making coffee”, “communicating”, or even “paying a bill”. A prevalent feeling of expectation to use technology in their teaching practice emerged amongst the interviewees who, further supported by 31.3% of survey participants, explained feelings of pressure from society, students, parents, peers, and administration alike leaving them with what they perceived as little choice but to adapt.

**Availability.** Teachers discussed the influence of availability and accessibility as factors in technology use citing the wealth of quality resources available online beneficial to students’ experience while greatly aiding the speed with which the teacher could amass resources. Furthermore, online resources reduced pressure on shrinking department budgets and made administrative tasks simpler and timely. It was noted that due to ongoing technological improvements, it was becoming more difficult to avoid its use. However, availability alone, as
previously discussed, was not enough rather a combination of normative and subjective components and availability influenced teachers.

**Engagement.** When considering why they started using technology in their teaching practice, teachers spoke of improving student engagement using technology “to make learning more hands on and get students more involved in their own learning”. In considering all data collected, 85.7% of teachers discussed the importance of providing their students with experiences in the classroom to enhance and deepen their understanding by providing extensions and differentiated learning opportunities as well as timely feedback for students and parents. Teachers saw technology as a tool for sharing ideas, communicating, and providing students with continuous access to course resources. Also of note, Sarah, Chris, and Kate expressed concern regarding misuse of technology by students and, as a source of distraction, questioned whether “students learn better/faster” with the use of technology.

**School environment.** During the interviews, teachers shared their views on the collaborative and/or individualistic nature of their schools. While the act of teaching was viewed as a solitary activity, the collaborative nature of the teaching profession emerged resulting in nine of the ten interviewees speaking of the dualistic nature of their school culture. While Chris stated emphatically his school’s culture is “fragmented and reactive” with “most people doing their own thing, paying lip service to collaboration”, overall, teachers spoke to small groups within their staffs being collaborative, often departmentally aligned, with a select few members on staff, recognized as technology experts, approachable for guidance and support. Dan described the act of teaching as “a very solitary and individualistic act” for much of the time but emphasized,
“The times for collaboration are sparser; but, I think when that collaboration happens, it can be very meaningful either organized collaboration or the informal that goes on before or after school or the quick chats by the photocopier with other colleagues.”

The dichotomy of both an individualistic and collaborative school environment surfaced as a common experiential observation prompting strong emotional responses from teachers interviewed. Weeping, Kate lamented “there are different pockets of staff and colleagues who are collegial or who are cooperative, who believe in the same things…who believe in helping kids to find their passion whether that’s in biological sciences or welding”; however, there are also those on staff that are “happy to live in their own little pocket and teach their subject matter well but don’t see past that”. Suzie echoed this sentiment identifying some teaching areas as more collaborative than others but the prevailing culture is individualistic in nature rather than collaborative. Jess felt as an electives teacher it was difficult to find opportunities to collaborate with her peers; additionally, she frustratingly observed that “most of the [collaboration] efforts are around academic subjects”. Jen believes most work in a collaborative way in “some way shape or form to some extent”; however, she admitted sadly, there are a few on her staff that work in isolation which she believes is a disservice to not only the students but also to the teacher as she believes in the benefits of working collaboratively. Harsher in his assessment, Chris explained his school culture is,

“fragmented in that very few of us have the same definition of Education, the same end game, the same end goal” and “it’s reactive in that we’re constantly trying to put bandages on things and stop gap measure without ever going back to the foundation of what it ought to be in a really philosophical sense”.

Incongruously, Mary and Sarah provided somewhat contrary observations about their school. Although Sarah’s experience over time has somewhat improved, she experienced obstinate inhospitable colleagues upon her arrival and throughout her first few years. She observed,

“In this school you have to prove yourself before people trust you. When you need the help, they won't give it to you. It’s only when you've worked on your own and shown that you don't need help that they will give you help. So it’s kind of this- it’s bit of an old-boys club I think in some ways”.

Mary spoke highly of the same staff; she observed, “given the size of the staff, given the size of the school, I would say this is a remarkably collaborative staff”. She went on to delineate specific attributes, “it’s communicative, it’s collaborative, there’s a lot of meaningful stuff that happens”. Similarly, Ann, in her current role at another school, felt she was a member of a “definitely collaborative” school culture, although she recognized this was a change from her previous experiences. Tina, in a contrasting experience, stated, “We don’t collaborate together. And as far as sharing resources and stuff like that, it is not a readily available thing. You have to go and ask which is humbling, so it often feels like you're putting people out”.

While teachers recognize that some attempts for support are on offer by district and school administration, many find it insufficient or ill-suited to their needs. As Dan summarized, “I realize there's a district technology plan. I realize there's a director of technology, I realize they're working with integrity on what they think is best for the district. But I don’t know that always translates through the different layers of bureaucracy to a meaningful support for me. Where I get meaningful support is running across the hall. Or
running to the person next door and saying, *Hey how do you do that again? Hey that app we have on our department account, how are you integrating that? How do I get Apple TV to go to the side screen again?*

**Peer support.** As determined by 43.8% of surveyed teachers, peer support and collaboration were significant organizational determinants supporting technology adoption prompting further discussion in the interviews. While some teachers expressed a desire for those currently using technology to share useful tips, Dan discussed he is “supported by colleagues” while a survey participant went so far as to state they “rely on certain colleagues”. Teachers, such as Tina, are seeking support from those “who are more experienced and knowledgeable in the use of the technology [they] are implementing”, preferring, as Jess explained, “learning in a small group from people who can weed out what would be useful and what would not” or “often it is more of a one on one situation where something specific I need to work isn’t working and I need to ask a colleague”. This unstructured collaboration with others with similar teaching loads “on an as needed basis”, as Dan determined, is “very powerful, very effective, very useful”.

The discussed contextual environment subjective and normative constructs of organizational factors and culture of teaching are interwoven in the notion of educational reform greatly supporting or inhibiting the ability of technology to act as an agent of change and aid in the transformation of the education system.

**Educational reform.** Digital citizenship and the requisite demands to continually adapt to meet the needs of global citizenry are reflected by national and provincial plans intent on educational reform (CSBA, 2011a; British Columbia, 2011). Transformation of culture is necessary for organizational change (Du Toit & Forlin, as cited in Porter, 2012). School culture
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refers to not only the organizational systems and structure but also the organizational norms, and individual members’, values, beliefs, attitudes, and relationships. These contextual factors influence organizational change; change that is facilitated by a team effort requiring investment in people, time and resources (Hall & Hord, 2001). Educational system requirements, expectations, and assessment of reform and plan implementation progress are delineated in the Education Plan (British Columbia, 2011), 2012/2013 Transformation +Technology Update (TTU) (British Columbia, 2012), 2013/2014 Transformation Plan (TP) (British Columbia, 2013), and A Vision for 21st Century Education (Premier’s Technology Council, 2010). During the interview process, perceived organizational demands at the provincial, district, and school level were revealed.

**Provincial reform: The BC education plan.** While the survey asked about technology use in generalities, the interview specifically focused on the Education Plan’s (British Columbia, 2011) fifth pillar, Learning Empowered by Technology. Seven of the ten interviewed, including Tina, Jen, Sarah, Ann, Jess, Dan, and Chris admitted outright they were not familiar with the document. As interviewees spoke to the topic, body language, tone of voice, ocullesics (looking down, lack of eye contact), and laughter seemed to reveal feelings of awkwardness, embarrassment, and hesitancy for six teachers who revealed their lack of knowledge about the topic. For Chris, antagonism towards the plan was apparent, with a sarcastic laugh he stated he had “an incredible physical aversion every time I hear it and until I get over my initial emotional reaction I can’t look at it with a critical eye. I need to sort out my own feelings first”. Mary, Kate, and Suzie spoke in relation to technology integration challenges but not specifically about the pillar commenting on the three Ministry of Education identified cross-curricular
competencies, the excessive emphasis on technology and the perceived lack of support and suggestions for implementation.

**District/school level demands & expectations for change.** In comparison to 34.4% of survey participants general feelings, in-depth discussions revealed all ten teachers sensed and experienced organizational demands and pressure to utilize specific technology as well as increase use of technology in their teaching practice; although Jen, Ann, and Tina admit they have never been spoken to directly about use of technology. Teachers’ reactions to these organizational demands ranged from passive to unmitigated resistance. Dan expressed his frustration over specific software use demands querying, is it “going to make my life better or just give somebody at the school board justification for their job?” Suzie spoke of the subtlety of pressure exacted stating, “admin asks for people who have website to email their link so it can be put on the school website [or] even when admin sends out a survey that starts by asking you to rate your tech abilities”. Sarah identified a stronger school administration driven impetus in that there is a “constant push of, Do you want an iPad? Do you need an iPad?” and a pressure to “finagle some sort of proposition and get one”. Chris responded that although his administration requires use of technology for administrative tasks and communication, he submits attendance via paper, he checks his email “maybe once or twice a week”, as well administration understands “if they want to get a hold of me, they come and knock on my door”. Similarly, while six of the 34 surveyed used “forced” as a qualifying descriptor, five admitted they are self-selecting how and when to incorporate technology. Expressing frustration with demands to use technology, with unmitigated resistance, Sarah went so far as to refer to the demands as the “Nature of the beast!” passionately stating “Technology and “21st Century Learning” is the newest catch phrase.
It’s a waste of money to replace “costly” teachers so that students will eventually rely completely on technology, IQs will drop even more rapidly = population control!” Interrelated, the success of proposed educational reform is reliant on teachers’ acceptance and adoption of technology, the final overarching theme of the TTIP.

**Teachers’ Acceptance & Adoption of Technology**

An individual must not only believe they will be successful in a given behaviour, they must also believe there is inherent value in engaging in that behaviour (Fishbein & Ajzen, 1975; Wigfield, 1994; Wozney, Venkatesh, & Abrami, 2006; Zogheib, 2005). Beliefs, values, attitudes, and self-efficacy in correlation with perceived external controls further influence planned behaviour (Ajzen, 1985; Lee, Cerreto & Lee, 2010; Sugar, Cawley & Fine, 2005).

*Figure 7. Transformational Technology Innovation Process – Teachers’ Acceptance and Adoption of Technology*
Moving beyond intention to practice, adoption of a given behaviour disseminates over time within a social system (Rogers, 1962; 2003) at different rates and levels of innovation (Rogers, 1962; 2003; Moersch, 2010). This section provides an overview of the outermost concentric ring of the TTIP, Teachers’ Acceptance and Adoption of Technology (see Figure 7): perceived role of the teacher, behavioural intention and use behaviour.

**Perceived role of the teacher.** Historically the singular source of information disseminating didactic prose, teachers’ roles are evolving to facilitators, stimulating students to actively and responsibly engage in their learning, and evaluators, assessing the value and merit of that learning (Carr-Chellman, 2000; Hattie, 2012; Houston, 2009).

In discussing their perceived role, teachers emphasized the importance of being not only knowledgeable but also passionate about their subject area as well as about learning. Evidence of traditional roles blending with the envisioned evolving role emerged. Dan referred to himself as “The Guy…directing, redirecting, [and] refocusing” students sitting in a horseshoe seating plan with the “centre area as his stage”. As well, he emphasized his inclusive practices responding to students’ needs, providing feedback, and creating an atmosphere of respect and sense of “we’re all kind of in this together” that he shares with his students. Suzie, a self-proclaimed “pragmatist” employed a “practical approach” that is project-based with “more time for the hands-on or creative side of learning to demonstrate what they are learning”. She saw her role was to facilitate as well as instruct in order to “provide a basis for students to explore further”. Widespread beliefs focused on the need to, as Tina passionately explained, “encompass all learners” by providing opportunities appropriate to the multitude of learning styles and unique
individual needs and in doing so, as Jen determined, “make education accessible [for] all learners”.

Beyond the teaching practices and student academic responsibilities discussed by teachers interviewed, tending to social and emotional needs of students emerged as a fundamental component in the role of the teacher thereby revealing beliefs, values and attitudes centred on the premise ‘what is best for the student’. Beginning with the most basic of needs, teachers such as Mary believed in the necessity of addressing students’ needs to be “warm, dry, fed, and emotionally safe before they are going to learn anything”. Teachers identified themselves as role models with the inherent responsibility “to encourage individuals to take responsibility for their learning” and ensure students feel “comfortable enough to take risks” explained Jess. As the interviewed teachers discussed their role, teaching practices, and philosophy, their depth of desire to help their students was undeniable. Passionately, rooted in their perceptions, beliefs, values and attitudes, they each emphasized the importance of reaching every child, identifying their individual needs, and providing them with the support they require. Throughout her interview, Kate wept as she explained her belief that “every student deserves an opportunity [and] an advocate”; her desire is for every student to find their “passion”. Consistently, teachers discussed the importance of forging relationships with their students built upon mutual respect as essential in order to best understand, support, and inspire their students. Out of their beliefs centred on the role of the teacher, strongly influenced by what they believed was best for their students, attitudes emerged regarding behavioural intentions.

**Behavioural intention.** Survey and interview questions presented a continuum of technology acceptance ranging from externally forced minimal acceptance to eager self-
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selection. Data collected included global views on the role of technology in society and, more specifically, within the classroom, to individualistic philosophies of the role of teachers. In addition, questions focused on teachers’ perceived value of technology, their self-efficacy, and behavioural intention which resulted in data on the teachers’ beliefs, values and attitudes, all of which were factors affecting their use behaviour.

*Attitude as predictor for behavioural intention.* As the most influential of a number of constructs compelling behaviour and shaped by feelings, attitudes are noteworthy predictors of behaviour (Ajzen, 1985; Lee, Cerreto & Lee, 2010; Sugar, Cawley & Fine, 2005). During the interviews, teachers discussed the role technology plays in the classroom and teachers’ role in relation to technology.

When asked *What role do you believe technology plays in the classroom?*, responses revolved around four perceptions. First, Mary Jen, and Kate discussed how it can enhance their teaching practice, delivery of lessons, and learning opportunities for their students thereby increasing engagement. In particular, Mary appreciatively expressed how it has helped “level the playing field in terms of participation” for her students “who have huge physical disabilities [and] can now participate in ways they never could have before [and] kids who have huge cognitive disabilities are now able to use a computer as a way of showing their understanding”. Second, Chris, Sarah and Mary deliberated on the disruptive and distracting nature of technology; while Mary focused on improper use of cell phones in class, Chris’ intense negative attitude was evident as he referred to it as a “profound agent of cheating” and “causes anxiety”. Third, Jess and Kate accepted technology tools could be useful in certain lessons or subjects but questioned the wide-spread expectation for technology implementation in the
education system doubting the value for all courses with people focused on, as Jess stated, “the newest trends and losing focus on whether is it actually improving the classroom”. Fourth, Tina and Ann’s attitude was one of resignation. Technology is not going away, “nearly every student of every age is exposed to technology on a fairly constant basis and most have access to their own personal devices”. Ann explained, due to the prevalence of technology in society, the “modern classroom needs to integrate technology in order to keep up with the students”.

When asked during the interviews, *What is your role as a teacher in relation to technology?*, teachers responses encompassed three broad descriptors including use in teaching practice, tacitly modeling use and explicitly teaching students digital literacy. Jen and Dan referred to utilizing technology as a tool making instruction, as Dan asserted, “more relevant, timely, much easier” and “more manageable”, according to Jen. Suzie, Ann and Mary emphasized their role in modeling behaviour through integration of technology in their teaching practice. Suzie noted students need to understand “there’s more out there than games” while Mary emphasized the need for teachers to have “some fluency around video gaming and mobile apps [and] current terms like selfie” in order to have “credibility to work with kids”. All but Jen and Dan discussed their responsibility and the challenging task of teaching students digital literacy, that is, Ann determined, “how to use it optimally, responsibly and safely” and to “apply critical thinking to figure out what is good or bad information and how to be responsible citizens around technology”, stated Jess. Determinedly, Chris has embraced “promoting critical thought” about technology as his personal “battle”. Teachers demonstrated critical thought engagement assessing personal capabilities and usefulness of technology in their teaching practices.
**Computer self-efficacy.** Perceived computer capabilities affect interest and desire to use technology as well as one’s resolve to overcome challenges that may arise (Compeau & Higgins, 1995; Celik & Yesilyurt, 2013). Experiences, individual characteristics, technology itself and the specific task further demarcate computer self-efficacy (McFarland & Hamilton, 2006, p. 431). Along with 68.6% of survey participants, Mary, Jen, Tina, Sarah, Ann, Jess, Dan, and Suzie declared their confidence in technology use; however, similar to survey results, all but Mary qualified their statements explaining confidence came with a variety of factors. “Not above asking for help or taking advice even from students”, said Tina while others described they felt confident after a technician or peer demonstrated a process or use step-by-step or when given the time to explore and learn the program or tool. Limiting themselves to basic functions of complex programs and tools, teachers felt “confident using these but sometimes need the help function”. Not having “enough time to explore and effectively create”, shared Tina she was most confident when using what others have created and have implemented successfully. Along with two other survey participants, Mary claimed confidence with what she described as “no problems with experimenting and exploring, and partly because I think it’s great for my students to see me learning something new”. While Chris had no comments for this line of inquiry, Kate, as did 21.9% of surveyed teachers, had an overall negative computer self-efficacy; however, 71% of those teachers clarified they were, as Kate expressed, “working towards [being] comfortable” and that “practice makes perfect”.

**Perceived usefulness.** Perceived usefulness has a significant effect on behavioural intentions (Aypay, Celik, & Aypay, 2012, p. 270) and behaviour is a function of beliefs and values (Bandura, 1977). In addition to a person’s beliefs regarding use of a system enhancing
their job performance, perceived ease of use is also a primary factor in acceptance and adoption (Davis, 1989; Davis et al., 1989). Interviews revealed the teachers’ beliefs, attitudes, and perceptions of technology’s usefulness.

In considering if technology had assisted them in their job duties or improved their ability to perform their job, mixed feelings were evident. Some, such as Mary, Jen, Ann, and Jess, enthusiastically agreed technology had allowed for easier completion of necessary paperwork at a much greater speed, it had improved abilities to create engaging lessons, and increased communication capabilities had positively affected connections with students, parents, and colleagues. While Mary emphasized, “my job involves a very great many individual tasks, and a hell of a lot of paperwork I could not possibly do it all without the computer and electronic technology that I access”, Jen touted technology “increases speed and availability of resources” and is a valuable “communication tool for engagement”. Ann expressed how technology is “greatly assisting” her with “communication with parents, colleagues, and students” not to mention her lessons are “all created on the computer”. Technology allows Jess to “get things done more efficiently most of the time, such as calculating marks, sharing resources and examples with students, and communicating with coworkers”. Others, such as Tina, Sarah, Kate, Suzie, and Dan agreed but with reservations. Tina, Kate, and Dan expressed concerns over lack of training limiting adoption and effective use. Focused on training and release time “with support to actually use what was learned”, Tina admitted “we have amazing tools at our disposal but we are ill-trained as a whole to use them”. Kate “would like to think, yes” technology is assisting and improving her abilities to carry out her teaching duties; however, she was hesitant to agree believing “it goes back to a lack of training and experience with the ever evolving
technology” that prevents her from effectively implementing technology. “Operational changes from upgrade to upgrade that require new techniques and protocols”, frustrates Dan. Sarah and Suzie expressed wariness over technology being utilized as a replacement for teacher/student discussion and interaction. According to Sarah, “certain aspects of technology can add to a lesson but there is no replacement for a good old fashioned discussion by a teacher who has made themselves an expert on their material who can engage their students”. While Suzie emphasized “technology in and of itself isn’t “it”, it’s how the teacher incorporates it into learning for students, and that ability rests in the teacher”. In relation to the interviews, surveys equally portrayed a sense of improvements through technology such as in communication and accessibility or increased student engagement; however it has been at the cost of something. Kate’s concern over loss of face-to-face interaction resonated with a number of survey participants one of whom stated that despite being more connected, “so many have never felt so alone…the level of social skills that are also being lost. Many of today’s youth don’t know how to carry on a socially acceptable conversation and feel singled out when their actions have consequences”. Corresponding interview data and survey results, revealed concerns generally centred on the negative effect on students such as loss of written or social skills, a decreased attention span correlating with demands for instantaneous feedback or action. As the lone outlier, considering interview and survey participants, Chris, firmly stated technology has not assisted him in his teaching duties nor has it improved his ability to fulfill his tasks.

During the interviews, teachers emphasized their concern for students and the potentially negative affect of technology on them juxtaposed with the societal and organizational demands. Chris commented in relation to his students and technology, “they don’t know what’s being done
to them by it” while Kate expressed, “I think we’re losing something in our physical-ness…I don’t think we necessarily need to be pushing it so heavily with our young kids”. Upon reflecting on technology and society, a sentiment echoed amongst the teachers was the requirement of technology skills demanded by society such as navigating the internet, utilizing various communication tools, and the general use of technology in work practices have become the norm. However, concerns expressed included notions such as Ann’s that technology is “challenging for those with little computer literacy…basic computer knowledge is essential rather than [an] optional skill in our modern society”. Tacit and open expectancy by society and education organizations alike are viewed, as suggested by Jess, as “the nature of the beast…keep up or be left behind whether you like it or not”. However, as Mary explicitly stated, “computers in a lot of ways have raised our standards…magnify what we are” both positively and negatively. A common questioning refrain from all interviewees was it comes down to why are we using technology and what technology are we using in what way and to what end?

**Use behaviour.** Diffusion of innovations within a social system requires acceptance, development of behavioural intention and finally implementation and confirmation in support of ongoing use (Rogers 1962; 2003). Innovation levels characterize teaching and learning practices delineating the complex relationship linking instruction, assessment and effective incorporation of digital tools and resources (Mehta & Hull, 2012; Stoltzfus, 2006). Survey and interview data provided an adoption timeframe sorting teachers into adopter categories, as well as a glimpse into teachers’ personal and professional use of technology, revealed factors influencing ongoing adoption, and effects of technology on teaching practices in correlation with levels of innovation along with examples of innovation in practice.
Timeframe. Over a period of time, a behaviour, product, or idea diffuses within the social system with individuals categorized into a framework according to the speed and conditions with which they adopt the new innovation (Rogers, 1962; 2003). Teachers self-assessed their technology adoption according to descriptors correlating to Rogers (2003) categories including innovator, early adopter, early majority, late majority, and laggard. As an innovator, Mary was one of four surveyed teachers who enjoyed being on the “bleeding edge…experiencing the trial and error of new technology [and] having a say in what will be promoted school or district-wide”. Early adopters Suzie and Dan, were part of the 27.3% of teachers surveyed who were not the first to adopt every new innovation but were quick with uptake when they could see the “value” explained Suzie and as Dan suggested, “it has been successful for a colleague”. Similar to 36.4% of surveyed teachers, Tina, Jen, Ann, and Kate were early majority adopters who took longer to accept technology innovations preferring to “wait and see if it increases student engagement and learning” as well as gage its “longevity” rather than “jump on a bandwagon” scoffed Jen. Late majority adopters, Sarah and Jess were part of the overall 21.2% of teachers who were skeptical of innovations expressing concerns over implementation “causing anxiety” for students and teacher alike and the possibility that there will be “something new again” the following year rendering previous innovations obsolete and unsupported by the school district. The one and only laggard, Chris, stated “there is very little that I like about technology”; in particular, he iterated, “I loathe the philosophy that technology is neutral and that it is the way that it is used that determines its value”.

Personal & professional use. Similar to the 90.3% survey result, all interviewed teachers had a computer at home for a variety of tasks and activities including staying
“connected to friends and family”, “serious genealogical research”, “gaming”, “entertainment”, and “school work” and as Chris emphasized “to pay the bills”. Smart phones were also widely embraced by all but Chris corresponding fairly closely with survey results of 87.1%. Teachers used them for linking to “work/personal emails, social media” as well as “texting and talking” or finding answers to “questions that can be answered online”. Those that did not have a smartphone cite reasons such as they are “too bloody small to see” and as Chris emphatically stated, “I have never, nor will ever have a phone other than the one plugged into my wall in the kitchen. Finally, all those interviewed, aside from Chris and Suzie, were part of the 77.4% of teachers who reported owning and using a tablet at home. Similar to computers and smart phone usage, tablets were cited as “convenient for on the run” activities such as communication, entertainment, and online research. Those that commented on not owning one cited reasons that intimated a cost-benefit judgment resulting in the decision, “bottom line is I don’t need it”.

Professionally, Mary, Tina, Jen, Ann, Jess, Dan, Suzie, similarly to 75% of teachers surveyed, reported using technology as a teaching tool in their classes as well as a resource for online research, preparing lessons, and creating resources for students. Sarah, Jen, Mary, Ann, Jess, and Kate, as did 68.8% of all teachers surveyed, articulated a variety of uses including: engaging with students both in and out of the classroom and as a tool for communication with administration, peers, students and parents. Of those interviewed, with 43.8% surveyed concurring, Mary and Tina discussed using technology to engage parents providing access to gradebooks in Moodle, communication bulletin board apps with “alerts about school events…aid in presentations to parents, blogs and websites explaining daily activities and assignments”; as well as providing better “communication with parents about their children” due to asynchronous
capabilities. Teachers also referred to administrative tasks such as attendance, marks, and email programs. Engaging with peers, teachers reported use of collaborative applications and communication tools to “enhance their educational experience”, share and create resources, and “to monitor students’ behaviour as it is tracked by other teachers”; however, Chris stressed, “I’m forced to use it for intra-school communication [and] grades recording”.

**Ongoing adoption.** Considering ongoing adoption practices, the most common response from all but Sarah and Chris, revolved around student needs as teachers desired, as one expressed, to “keep up with the kids and try to make teaching and learning relevant to them in the world they live in”. Computer self-efficacy also emerged as a driving force, for example Mary explained personal characteristics “curiosity, optimism and a desire to explore” and a “drive to be better”. Peer influence was the third most frequently mentioned factor with Mary, Tina, Ann, and Dan, similarly to 36.7% of survey participants, mentioning that “hearing what others are doing” they “tend to follow the trends of other colleagues” and are inspired by “professional conversations, blogs, online and print reviews” by peers. Social norms, that is, the societal influence of tacit expectations due to the prevalence of technology, compels 16.7% of teachers surveyed to continue use with Tina explaining, “Technology is not going away. If you don’t try to learn and keep up, you’ll be lost to use it. I don’t want to be lost any longer”. Still others alluded to organizational demands as a driving force of their technology use with Mary explaining staff members complain about being “forced to go to training workshops” or “Ministry requirements” for students to gain specific skills in certain courses, or as Chris, Jess, Kate and two other survey participants stated, being “required by the office” to use email, attendance, and grades programs. Equally, five teachers, including Ann, Tina, Jen, and Jess
discussed organizational support as influencing their continued use of technology in their teaching practice with factors cited of “in-service mornings”, and “the availability of resources”.

**Innovation.** According to self-analysis, 81.3% of survey participants agreed technology had altered their teaching practice while 18.8% claimed there was no change. Of the six teachers that claimed there was no change, five explained that being so new in their careers it has always been a part of their pedagogy with one clarifying, “I don’t really know any other way”.

Categorizing teachers’ responses according to Moersch’s *Levels of Teaching Innovation* (LoTI) framework, of note, only Chris was classified in the non-use category while the majority including Jen, Kate, Dan, Jess, Sarah, and Ann, were classified in the awareness level of innovation, similar to the survey rate of 56.3%. Interestingly, aside from Ann, 80% of teachers with one to three years’ experience are beyond the awareness level with members of the group within the exploration, infusion and expansion levels thereby reaching the highest level of innovation and the most even distribution across the various levels. Tina and Suzie, were two of the three teachers rated in the exploration level and Mary operates at the integration routine level providing examples such as use of “galvanic skin response switches and mercury switches to see if a student with no mobility could access and control his environment”. Of interest, 57.1% of teachers surveyed with 21 to 30 years’ experience, including Suzie and Mary, were categorized as above the awareness level.

**Innovation in practice.** During the interviews, teachers expounded on practices incorporating technology innovation. Chris explained his lack of innovation and resistance to it remarking “there is very little I like about technology…there is a motive behind every invention and technology and with the rapidity that we are being inundated it is impossible to unravel those
motives”. For administrative tasks such as attendance, he sends it “on a piece of paper” to the office staff. Within the awareness level of innovation, Sarah, Jess, and Kate described use of technology to complete administrative tasks as well as share information with their students, enhance lectures, and create digital presentations for lectures. Jess noted, “I have found it most useful in sharing ideas and images that would otherwise be very difficult to access”. While Sarah admitted to using a blog and email, she no longer encourages students to look up information on their own devices as her experience has been “they just don’t have the maturity or the discipline to only use it for certain purposes”. Tina, Jen and Ann have moved beyond awareness into the exploration level engaging students in extension activities to fortify cognitive development on required course outcomes. Utilizing her SMART Board™, iPods, Google Docs, and YouTube, Tina’s students participate in hands-on activities such as creating a news broadcast incorporating lessons learned in class. At the mechanical integration level, Suzie requires her students complete assignments in which “they research and present information using the computer, whether it’s a presentation, Prezi, word processed document, glogster, or other web tool” as well as take part in online forums and utilize websites to “complete tasks such as diet analysis”. Operating within the routine integration level, Mary encouraged her students to ask questions, research, seek and discover answers online. Furthermore, her students with physical and emotional challenges have found new ways to interact with the world around them through technology in the classroom.

**Summary**

Chapter four opened with descriptors of survey and interview participants providing a contextual basis to deepen understanding of responses and lived experiences of the teachers.
With the central question and four sub-questions providing direction, data collected was organized into three major categories according to the Transformational Technology Innovation Process: technology as agent of change, contextual environment: normative and subjective components, and teachers’ acceptance and adoption of technology. With technology largely defined as a tool for enhancement, discussions of acceptance and adoption revealed concerns over locus of control, demands and perceived expectancies. As well, teachers questioned the value of technology and implementation challenges which exposed teachers’ values, beliefs, attitudes, as well as influential social and organizational factors affecting behavioural intention and use behaviour resulting in establishment of sub-themes within the TTIP. The comprehensive summary of teachers’ perceptions of technology, behavioural intentions, use behaviour, and factors that influence each of these constructs provides a basis for the next chapter. Chapter five provides an analysis of data in relation to the literature review and presents the themes and sub-themes that emerged utilizing the Transformational Technology Innovation Process model as a framework for presenting the information.
CHAPTER FIVE: RESEARCH ANALYSIS AND RECOMMENDATIONS

Introduction

This chapter includes discussion and analysis of the lived experiences of the ten SD33 secondary teacher interviewees contextualized through data collected from the 34 survey participants. Correlations are drawn between overriding themes and relevant literature. The Transformational Technology Innovation Process (TTIP) (see Figure 4), as described in Chapter Four, illustrates the dynamic interplay of the concentric rings and their interrelated components and constructs through the interconnectivity of the data collected in relation to the theoretical framework. Research findings and analysis are presented in this chapter utilizing each of these overarching and sub-themes. Within the central ring, technology has the potential to act as an agent of change; linked with the central ring, the interdependent rings of Contextual Environment and Teachers’ Acceptance & Adoption of Technology illustrate the transformational and far-reaching capacity of technology to affect change in the role of teachers, schools in society and collectively behaviour, culture and structures.

Technology: Agent of Change

The digital era demands digital literacy, skills and knowledge in response to evolving realities (C21 Canada, 2012; CSBA, n.d.; Hockley, 2012; Jukes, McCain, & Crockett, 2010; Premier’s Technology Council, 2010; Steeves, 2012). Within the education system, reform will come through the effective integration of technology which requires a change in teachers’ roles to facilitator, coach, and guide with a focus on activating learning. The centre ring of the TTIP (see Figure 4) connects how teachers define technology as well as their beliefs, values, and attitudes in correlation with societal and organizational expectancy which influence behavioural intention and use behaviour thereby the degree of situational transformation through technology.
Technology defined

As a starting point for understanding perceptions of technology, surveyed teachers were asked to define technology thereby exposing inherent values, beliefs and attitudes held in relation to the general construct ‘technology’. While one teacher referred to it as “Pandora’s box, the overriding view was neutral or positive in nature with teachers identifying technology as a tool applicable to learning, communicating, and creating. However, during the in-depth interviews, a more impassioned image emerged in relation to views on technology in the classroom. Three teachers viewed technology through a negative lens as a destructive force with Sarah believing it is “making kids dumb so that the government can control them more” while Chris believed that it “cause[s] visible anxiety…it’s an agent of conflict [and] it extends and perpetuates conflict”. Chris was particularly emphatic that he has not “seen it used in an educationally sound way”. Two teachers questioned whether technology should play a role in the classroom at all. Jess pondered, “people can get caught up in all of the newest trends and lose focus on whether it is actually improving the classroom or just adding an extra layer of unnecessary stuff” while Jen referred to technology engaging students and Dan spoke to qualities making his teaching task easier due to accessibility to information and resources.

Suzie, Kate, Ann, Tina, and Sarah took a more pragmatic approach desiring a greater focus on digital literacy in order to mitigate what Sarah referred to as “a battle we’re constantly trying to wage” with students appropriate use and teachers’ effective implementation of technology into their teaching practice. In these attitudes, the interplay between the TTIP concentric rings is discernable. Although teachers’ expressed an overriding general acceptance of technology as a tool allowing for and leading to enhancement, adoption levels in teaching
practices was limited by their concerns and perceived challenges resulting in teachers questioning technology implementation into the classroom. Understanding perceived external control at societal and organizational levels in correlation with technology as an agent of change illustrates the relationships in play and the need to address the process and method of implementation. Teachers’ generally positive view of technology demonstrates acceptance; however, the apprehension to adopt technology at significant levels illustrates the lack of clarity in effective, educationally sound and purposeful implementation strategies of transformational technology; concerns over perceived external control and the alleged resultant effect on teachers, students and the education system emerged as an influential factor.

**Perceived External Control of Society**

Demands of the digital world are altering global economies and societies resulting in our youth, born into this digital age requiring new skills (C21 Canada, 2012; Jukes, McCain, & Crockett, 2010). Due to this reality, teachers, such as Tina, expressed pressure to embrace technology commenting, “we’re in a technology based society now…we can’t go, really go, back in time, so you might as well learn to be literate”. Digital literacy demands new skills but at what cost; teachers expressed concern over how “kids now want everything instantly” and students are losing skills due to their reliance on technology such as “spell check…a skill that has become dependent on technology itself” or “depleted social skills, work ethic, [and an] increased short attention span”. Yet, teachers assessed, technology is “quickly becoming an essential part of everyday life, and it seems like those who don’t buy into it are seen as outsiders or behind the times”. Chris went so far as to state, “your membership in a community is often
defined by your role in your online communities”. Sarah identified problematic subliminal societal factors in “constant ads and always hearing about how the new thing is the best thing”. Teachers readily admitted “we now live in a world where we can instantly have access to any information we want” and, as Dan pointed out, “active citizenship requires knowledge”. Recognizing the societal demands and what Mary determined as the “new social rules emerging” in addition to the challenges and potential for negative outcomes, teachers overwhelmingly agreed training in digital citizenship, the responsible, ethical, safe and effective use of technology, is required for the successful future of their students. As there is no unified directive to guide teachers, digital citizenship training and implementation of technology and how it plays out in the classroom varied depending upon the teacher. While some teachers were seeking to engage students in a “desire to teach [their] students about what they will see in the real world and what technologies they will use in their careers”, critical thinking emerged as of primary importance, relating to Prensky’s (2009a) construct, digital wisdom. Perhaps Mary’s statement best summarizes the teachers’ perceptions, “we are in the wild west in terms of technology in that it’s a frontier” and there is a “hell of a lot of pressure on all adults, but especially teachers, to provide instruction in a milieu they don’t fully understand themselves”.

The theories of planned behaviour and expectancy-value state behaviour is compelled. It is evident technology is affecting change, to what extent change has and will happen within the education system will be determined by the teachers’ perceptions of the supportive or inhibitive nature of normative and subjective components in relation with their willingness to accept technology, the degree to which they adopt technology, and the level of innovation to which they engage with technology.
Contextual Environment: Normative & Subjective Components

Technology is shaping the digital era and the resultant creation of the digital generation while reshaping how this and future generations of learners will be taught (Jukes, McCain & Crockett, 2010; Harwood & Asal, 2007; Small & Vorgon, 2008); a central educational system challenge requiring organizational change through effective change management leadership. The interplay between TTIP (see Figure 4) rings is evident in the contextual environment components; technology as the change agent force influences organizational factors, the culture of teaching and educational reform. In turn, the contextual environment supports and/or inhibits both the agent of change and teachers’ acceptance, adoption of technology, and levels of innovation. This section discusses the teachers’ perception of the contextual environment components in relation to literature reviewed.

Organizational factors

External variables play a role in an individual’s attitude which influences behavioural intention and ultimately actual use behaviour (Ajzen, 1985; Fishbein & Ajzen, 1975; Lee, Cerreto & Lee, 2010; Sugar, Cawley & Fine, 2005). Organizational demands, structure, and culture factors serve as stimuli through which technology realizes change within the system.

Demands. Organizational demands are formally transmitted through the Education Plan (British Columbia, 2011) with further support and recommendations arising out of the 2012/2013 Transformation + Technology Update (TTU) (British Columbia, 2012), 2013/2014 Transformation Plan (TP) (British Columbia, 2013), and A Vision for 21st Century Education (Premier’s Technology Council, 2010). Teachers’ indifference to unequivocal aversion to provincial level plans appears rooted in an historical relationship, at times antagonistic, during
which time initiatives have been propagated only to fall from favour as new initiatives emerged. Teachers’ discussed these provincial plans and initiatives in terms of the latest “bandwagon”, “fad” or “catch-phrase”; however, the teachers interviewed were simply unaware of any details of the latest Education Plan (British Columbia, 2011). This in addition to body language, tone of voice, and oculsics implied frustration and irritation at mere mention of the Ministry of Education and its initiatives speaking to the uneasy relationship and its negative affect on teachers’ willingness to accept provincial direction. Of the teachers that spoke to district and school level demands and expectations, more than a third described being forced to utilize technology for various tasks expressing irritation or obstinacy with use being seen as “simply for the sake of using” technology yet only 18.8% of all teachers surveyed expressed a desire for less organizational pressure to use technology. It should be noted that given the choice, 62.5% surveyed saw value in technology and self-selected use thereby prompting initial use in their teaching practice. In these cases, teachers have answered the invaluable question ‘why’ prompting an answer that provides evidence of the need for change, a necessary factor in organizational change (Lewin, 1951; Connelly, 2014a). Professional development should be utilized as an effective vehicle for disseminating information teachers require to answer questions and provide compelling reasons for reform as well as provide explicit training necessary to support the desired organizational change.

Professional development support. While support is purported in the Education Plan (British Columbia, 2011) and identifiable in district initiatives such as “technology in-service mornings have been set up”, there appears to be disconnect between teachers’ perceptions of support provided versus what they feel they require. While surveyed teachers identified ten
organizational factors that influence technology use, interviews revealed three primary issues. Most significantly, teachers identified lack of or insufficient training relevant to their teaching practice. Teachers are seeking “workshops that are more relevant to the things teachers really use” provided in “sessions where we are using technology to create an actual meaningful something to use in the classroom”. Current professional development on offer focuses on discussing multiple programs in a general sense leaving teachers feeling there is a lack of “support for the adoption of technology that is useful in [their] subject area” and reticent to join in on training opportunities as they do not see the value or relevance stating “I don’t do well with in-service since most of it is not useful for me”. Second, large heterogeneous groups in training sessions result in either general instruction or, teachers such as Kate determined, the “focus ends up being on the largest component (eg. English teachers or whatever) or the instructor’s personal interest”. Third, with lack of specific training, teachers identified time to “watch and learn”, develop, practice, and implement technology as “so much is trial and error” and teachers want the time necessary “with specific technologies and teach [themselves] how they work”. One teacher’s comment seemed to summarize much of the surveyed teachers’ sentiment regarding professional development on offer by the district:

“It usually consists of a Computer Nerd Tech telling us how this program will transform our lives/teaching without letting us get hands-on with the material. Look! See! Marvel! So I nod my head, endure the session and ignore the material mostly. People need time to explore and embrace material, which is something the district has been unwilling to fund.”
Teachers, however, recognized increasing district and school efforts; however, desire for relevant and timely training was emphasized throughout the surveys and interviews. During her interview, Ann expressed, in comparison to her past experience, there appears to be somewhat improving professional development offered and collaborative groups forming this year; her “coworkers, on the other hand, always seem to be willing to lend a helping hand”. Sarah expressed a common sentiment, albeit in her unique style of speech, referring to how a “couple of geeks on staff let themselves known...sometimes they’ll come and hold their own collab and help out if someone has the interest”. Peer support through formal but primarily informal collaborative training/learning opportunities is a significant factor influencing teachers in their use of technology and is discussed later in greater detail.

**Technology support.** Despite the *Education Plan* stating issues of connectivity and access to digital tools and resources were to be addressed (British Columbia, 2011), other organizational factors raised by teachers were issues related to availability and accessibility of technology. While a significant number of teachers acknowledged technology was available in their schools, access was limited due to the ratio of equipment to student population as well as concerns over reliability of infrastructure and quality of resources.

The issues presented in organizational demands, professional development support, and technology support in relation to availability and accessibility all served to hamper the degree to which technology was adopted thus limiting the transformational change potential of technology illustrating the inward and outward interconnectivity of the rings in the TTIP. As well, these contextual dynamics serve as factors in the shaping of the culture of teaching.
Culture of teaching

The culture of teaching refers to the role of teachers within the context of the educational system and its organizational constructs in relation to societal constructs all of which are interrelated contributing to and influencing educational reform. It is the interplay of the teacher role within this broader context that requires analysis and appreciation in order to understand the correlation to teacher acceptance and adoption of technology, the outer ring of the TTIP (see Figure 4). Discussing the school environment as well as the social and organizational environment in relation to the effect on teachers provides an encompassing view that is the culture of teaching and, further, situates the role of the teacher.

In considering the importance of peer support in the diffusion of technology innovation among teachers, the passion with which teachers deliberated on the school environment directly links to research of Porter (2012), Fullan (2001), as well as Hall and Hord (2001) regarding the importance of culture as elemental in prompting change in education. Camaraderie and a shared sense of beliefs, values and attitudes unite the powerful force of teachers. Therefore, building a positive and collaborative school environment by providing time for and supporting effective peer collaboration, improved levels of technology availability and accessibility, addressing concerns over appropriate student technology use, effective and timely professional development opportunities for would assist in uniting fragmented staffs, as well as improve teachers’ computer self-efficacy leading to higher levels of innovation. Understanding the interconnectedness of factors within each concentric ring of the TTIP, organizational supports can hinder or empower these relationships recognizing the affect each has on the other will provide an environment conducive to educational reform.
Educational Reform

Whether considering national or provincial education interest groups, efforts of the provincial government, or education researchers, a call for change is echoing across the nation. The *Shifting Minds* report (C21 Canada, 2012) spoke to global demands and called for system transformation, the TTU (British Columbia, 2012) called for engagement, communication and collaboration among all invested partners to successfully move forward while the *Education Plan* (British Columbia, 2011) offered a five pillar plan to instigate change. If we recognize we need change, why are we not making the change? Lewin’s (1951) model of change emphasizes the need to provide an answer to the question ‘why’, that is, what are the benefits of change. Process ownership is required; however, teachers need a compelling reason to accept and work through the process of change as well as a clear vision proffered by leadership as to what that change looks like in the day-to-day practice of the classroom.

Teachers expressed the desire for “more support in the adoption of technology”; however, with a lack of vision as to why it should be implemented and ineffectual training teachers are left feeling it is, as one teacher iterated, “difficult as they tend to assume that we should know how these things work (I am often left feeling like I am really stupid)”. Despite proselytizing change, educational reform is hindered at the school level when teachers perceive hesitancy and caution from leaders as a teacher pointed out, “it would be nice if the district was a little more open minded about technology and not so worried about the problems they cause”. Furthermore, teachers are eager for necessary relevant, timely, and focused training; as Kate pointed out during her interview, teachers cannot be “pigeon holed into a funnel that says this is how we’re going to use it because that’s not how it works in my discipline area”.

Greater support would be realized if educational leaders at the provincial, district, and school level demonstrated what the teachers’ perceive as a genuine concern for the system. This may be accomplished by responding to teachers’ needs and providing the desired supports that would encourage acceptance and adoption of technology leading to higher levels of innovation. However, as Hall and Hord (2001) noted, change requires a team effort as well as investment in people, time and resources. Teachers must equally be prepared to connect with the Education Plan (British Columbia, 2011) actively participating in education reform through authentic and meaningful collaboration and taking responsibility in the role they play within the contextual environment. These relational factors resonate with the TTIP’s interconnected rings. Each component acts as a force upon the others while simultaneously they are acted upon; this interconnectedness extends to the outer ring, Teachers’ Acceptance and Adoption of Technology.

**Technology prompting change in schools.** Technology is changing our educational system and the daily experience of the classroom. Positive change requires carefully planned and supported implementation. Top-down change, as directed in the Education Plan (British Columbia, 2011) and recommended in Shifting Minds: A 21st Century Vision of Public Education for Canada (C21 Canada, 2012), calls for teacher action yet no clear vision or specific strategies for transformational educational technology implementation is proffered for classroom application. Ineffective dissemination of the official Education Plan was evidenced by the lack of knowledge of interviewed teachers. Suzie noted, “I know more about the three cross-curricular competencies – communication incorporates digital literacy I believe” and with a laugh, Mary sarcastically commented, “Well, I think they’d like us to empower learning by
technology!” Thus, lacking an illustration of the vision being translated into the day-to-day milieu of the classroom and school as well as a sense that embracing technology in the educational landscape is the latest fad, it is not surprising teachers demonstrated reluctance in accepting plans; as Dan explained, “I’ve learned over the years that the bandwagon, it’s usually a bandwagon, disappears after a year, or two, or three” while Mary’s evaluative statement focused on the success with which she sees it being implemented, “I don’t see that they have any strong suggestions about how we might go about that or more importantly, any money to make it happen”. Without a clear vision of how to implement provincial education plans in relation to diffusing technology throughout the system, teachers may not see the value or possibilities of use. For example, Kate shared, “we’ve changed everything to be this 21st century learners, and not that I don’t disagree with that, but it doesn’t always fit in with my teaching area”. Failing to see the value and opportunities technology provides, acceptance and adoption, thus potential for change, is limited.

Technology is changing how teachers do their jobs; however, surveyed teachers reported limited organizational support in the adoption of technology. As one of a multitude of determinants, organizational support affects technology usage (McFarland & Hamilton, 2006); yet, concerns were raised over lack of support in terms of training, time to develop, practice, and implement technology as well as financial backing required to execute the plan. Despite these challenges, tacit and explicit organizational expectations to utilize technology require teachers to adopt technology for specific tasks and encourage broad use in teaching practices; as Jess explained, there is “pressure to use technology for things like marks collecting, administrative type tasks, and just being able to navigate certain programs day to day”.
In combination supportive organizational factors, a positive culture of teaching, and mindful educational reform are conducive to teachers’ acceptance and adoption of technology thereby providing an environment in which technology can act as a progressive transformational agent of change.

**Teachers’ Acceptance & Adoption of Technology**

As explained through the theory of planned behaviour, an individual’s attitude towards behaviour, the subjective norms, and perceived behavioural control compel behaviour (Sugar, Cawley & Fine, 2005; Lee, Cerreto, & Lee, 2010; Ajzen, 1985). Teachers’ acceptance and adoption of technology, the outer ring of the TTIP (see Figure 4), incorporates the perceived role of the teacher, behavioural intention, and use behaviour in relationship to the two inner ring constructs.

**Perceived role of the teacher**

With the push for educational reform along with technology acting as an agent of change, the role of the teacher must and is evolving. Teachers are being called to action to share their skills and knowledge, advocate for modernization of the educational system and to engage in innovative teaching practices. Education reform is changing the role of the teacher from lone expert and purveyor of information to enablers and activators of learning (Hattie, 2012). As illustrated in the outer ring of the TTIP, how teachers viewed the role of technology in society and the classroom as well as their personal beliefs, values, and attitudes shaped their perceived role of teachers, behavioural intentions and subsequently their use behaviour.

Teachers’ roles are a reflection of culture and society’s needs (Houston, 2009); the teachers in this study recognized the significant role technology plays in our society with both
positive and negative outcomes possible. They perceived societal pressure “to keep up in the world” and that use of technology in their teaching practice “was sort of a no choice type thing”. Teachers reported feeling pressure derived from government, administrators, parents, students, as well as peers. A range of beliefs emerged regarding the role of technology in the classroom. Although the vast majority have accepted it most have done so with reservations. Many of the fears, reservations expressed, and blended traditional and evolving modern vision of teaching are evidence of transition, the second stage of the organizational stage process (Lewin, 1951). This is a crucial stage in which support through provision of the answers to the ‘why’ and ‘what’ questions will spur the ongoing evolution or a lack of support and guidance will result in teachers reverting to what they know. It is important to note, however, the change may eventually come with attrition as the teachers early in their careers expressed technology use is engrained in their “pedagogy” as it was essential in their teacher training program’s “philosophy of education”

Addressing needs of students was the greatest factor in the teachers’ perceived role; teachers believed they had a responsibility to attend to the whole child’s needs including social, emotional and physical, sometimes before any learning could take place. The evolving role proffered by Hattie (2012) sees teachers as activators and evaluators while the PTC (Premier’s Technology Council, 2010) explicitly outlines teachers, working as the core of the education system, are coordinators of purposeful activity promoting students’ self-directed learning behaviour. In order for change to happen to teachers’ roles and for them to be broadly implemented throughout the system, how teachers’ perceive their role in relation to the evolving education system must change (Carr-Chellman, 2000). Based on the teachers’ focus on what is best for the students, educational leaders may support organizational change by providing
compelling answers to the ‘why should we change?’ question that revolve around benefits to and needs of students.

Recognizing students today have grown up embedded in a technological world many of the teachers agreed with Ann’s sentiment that they “need to integrate technology in order to ‘keep up’ with the students and to keep the content relevant and engaging to them”; because of this, most of the teachers agreed they had no choice but to adapt. Teachers were adamant that adapting to incorporate technology also required ensuring students were taught what Prensky (2009a) referred to as digital wisdom. However, not all the teachers were open to embracing technology or are limiting innovation in their practice. With Chris, the established non-user laggard and more than half of the teachers operating in the awareness level of innovation, the possibility for transformational change through technology is significantly limited. As illustrated in the TTIP, the three concentric rings must work synergistically in order for profound change to occur. Behavioural intention reveals the beliefs, values and attitudes regarding technology predicting technology adoption and levels of use.

**Behavioural intention**

Understanding why teachers do not use educational technology is more important than why they do (Surry & Ely, 2007, p. 107). Uncertainty, fear, confusion, and a lack of effective and relevant skills training influence their behavioural intention. In understanding this, educational leaders will be better able to provide support through resources, professional development, as well as address concerns that may be inhibiting teachers from embracing change and implementation of transformational technology.
Behavioural intentions are significantly affected by perceived usefulness (Aypay, Celik & Aypay, 2012). Overwhelmingly, teachers believed technology assists in the performance of job duties; however, half of all the teachers had reservations which were primarily focused on perceived negative effects on students, consistent with their established student focus. In-depth interviews revealed teachers are searching for answers to explain how the use of technology will benefit their students. Four belief constructs emerged regarding technology’s role in the classroom: one, the ability of technology to enhance teaching practices thereby increasing student engagement; two, technology acts as a source of “disruption” and “distraction”; three, technology is applicable to finite classes and situations; and fourth, resignation with teachers’ giving way to what they viewed as an unstoppable force of modernity. Three belief constructs emerged regarding the perceived teachers’ role in relation to technology; one, technology is a tool to be utilized to ease the task of teaching while making it more “relevant” and “timely”; two, teachers should be modeling appropriate use of technology in their teaching practice; and three, teachers must teach and promote digital literacy emphasizing “critical thought” and “responsible citizenship”.

A large number of the surveyed teachers shared their confidence in using technology and willingness to learn by “experimenting” and “exploring” in order to become “comfortable”. Teachers’ experiences and individual characteristics in combination with technology in use and tasks performed determine computer self-efficacy (McFarland & Hamilton, 2006). Furthermore, interest in and desire to utilize technology and teachers’ determination to overcome challenges they may face in the process of accepting and implementing technology into their teaching practice are significantly affected by their perceived computer capabilities (Compeau & Higgins,
In understanding this, the more significant data is the 21.9% of surveyed teachers with a negative computer self-efficacy which will limit or inhibit district wide implementation of transformational technology. Understanding why those particular teachers hold negative beliefs may provide opportunities for overcoming barriers. Perceived values of technology provide insight to influential factors affecting self-efficacy and comprehensive acceptance of technology.

Dynamically acting each upon the other, perceived value and belief a specific behaviour is beneficial are interdependent factors within a motivational framework (Fishbein & Ajzen, 1975; Wigfield, 1994; Zogheib, 2005). Teachers’ perceived value of technology focused on five positive constructs which were discussed in terms of improving teacher practice and increased student engagement with an element of embracing life-long learning through the requirement to learn new things. Correlating this value and the overwhelming belief technology assists in job duties and has been a source of improvement in communication, accessibility and engagement of students, an inherent belief in the value of technology is evident. Identified dislikes, reveal issues linked to perceived ease of use, as well as organizational structure and culture factors. Resolving these barriers to greater acceptance and adoption would result in a positive effect on behavioural intentions. Cost and maintenance requirements as well as technology access are challenging financial issues that seem to be addressed in the Education Plan (British Columbia, 2011) “Action Steps” in that “learners, educators and families will have improved access to digital tools and resources that support both face-to-face and online learning” (p. 7); yet, it is clearly an ongoing issue. Providing teachers with a clear vision of what transformational technology implementation looks like and why it is important coupled with effective, timely and
focused training will cultivate a total learning environment conducive to transformational technology acting as an agent of change thereby addressing the dislike descriptors: source of distraction, potential for misuse, increased pressure and expectations, forced to learn/lack of training, and speed of change. Addressing inhibitive organizational factors, negative perceptions of the role of technology in the classroom, clearly defining teachers’ role in relation to technology and improving teachers’ computer self-efficacy, will assist in altering use behaviour.

**Use behaviour**

As behaviour is a function of beliefs and values (Bandura, 1977), the teachers’ adoption of technology is understandable. The teachers’ time frame of adoption, self-assessed levels of personal and professional use, identified influential factors in the continued use of technology, and levels of innovation to which they engage, correlate to the teachers’ behavioural intention, the contextual environment, and the technology itself acting as an agent of change.

Teachers demonstrated broad acceptance and extensive use of technology in their personal lives for a variety of purposes including communication, research, and entertainment. Negative attitudes were limited to a few teachers “opting out” of technology use due to negative valuation in that a lack of perceived value or cost expenditure outweighed need. As well, Chris described his negative attitude as a passionate dislike of technology due to the belief, “the primary purpose of pop-technology is to distract, subvert, and trivialize”. In line with the diffusion of innovation model created by Rogers (1962; 2003), teachers self-assessed their adoption of technology, in a professional context, as ranging from innovators to laggard. While the majority self-select to use technology, but may be limited by various challenges, there are a
number of teachers that are “forced” into their use behaviour. Challenges and forced use may be contributing to the large number of teachers limiting their use to the awareness level of innovation. A concerted effort is needed to overcome identified organizational structural and cultural factors limiting adoption and innovative practices; in particular, “limited accessibility”, “faulty” equipment, reservations regarding value and benefits for students, and lack of time and “meaningful training” hamper the degree to which technology is adopted.

Ongoing adoption and technology use at increasingly higher levels of innovation demands teachers embrace continuous change and demonstrate ongoing willingness to overcome challenges in a complex system; as noted previously, there is “no time to settle into comfortable routines” (Connelly, 2014b, para. 3). Surveyed teachers identified student needs, peer influence, and self-efficacy as the primary factors influencing their continued use of technology in their teaching practice. Yet, social norms as well as organizational demands and support were identified as playing a role; these factors are normative and subjective components within the middle concentric ring of the TTIP thus further evidence of the interrelated relationship of each component within the model.

With all but one teacher agreeing, the vast majority of teachers determined technology has supported their technology infused pedagogy or altered their teaching practice; evidence organizational change is in progress. However, according to LoTI (Moersch, 2010) categories, almost 60% of the teachers surveyed are at or below the awareness level which focuses on technology as a tool for disseminating information to students, with a “teacher-centred focus”, providing students with “lower-level cognitive skill development” and aiding teachers with “curriculum management tasks [and] to enhance lectures” (p. 6). This data brings new meaning
to diffusion of innovation data categorizing teachers from innovators to laggards as the timing or rate of technology implementation into teaching practice is not enough, it is the level to which that implementation is at that is the key to educational reform. Relating this to self-efficacy, the perceived value of technology, the realization and level of acceptance that the role of the teacher is changing, and the attitude and beliefs centred on doing what is best for the student, much of the groundwork has been laid with regards to values, beliefs and attitudes necessary for progressively higher levels of innovation. Addressing organizational factors acting as impediments and providing relevant and meaningful supports would have far-reaching constructive results in the interplay of the Transformative Technology Innovation Process.

Summary

Utilizing the interconnected Transformational Technology Innovation Process as an organizational framework, Chapter five provided a discussion of the lived experience of ten SD33 secondary teachers with survey data serving as the contextual basis for enabling primary interview data analysis. Data revealed teachers’ general acceptance of technology did not translate into adoption at high levels according to Moerch’s (2010) Levels of Teaching Innovation. Concerns over how technology is being utilized, societal and organizational demands to embrace technology and perceived expectancies’ to incorporate technology into teaching practices were interconnected with the organizational factors, culture of teaching and educational reform constructs within the contextual environment. This interplay influenced the teachers’ perceived role, behavioural intentions and ultimately their use behaviour. Concerns over what is best for their students emerged as a primary influential factor rather than demands formally transmitted through provincial plans. Teachers expressed a desire for relevant and
timely professional development as well as time to learn and implement technology into their practices. Peer support and informal collaboration emerged as key to teachers’ acceptance and adoption of technology. As well, as Lewin’s (1951) model of change emphasized, study data spoke to the need for process ownership amongst teachers in order for purposeful and effective educational reform. This requires dissemination of a clear vision of reform in practice, genuine support and care for and among all stakeholders, effective aforementioned professional development, and providing answers to the questions, why is educational reform necessary? and what is the teacher’s role in this process?.

Based on outcomes of this study, Chapter Six provides a synopsis, seeks to provide recommendations to aid in educational reform, and suggests topics for future research.
CHAPTER SIX: CONCLUSION

Synopsis

Change will not happen within the education system until those within it change (Hall & Hord, 2001). This study determined the process is underway; data collected provides evidence teachers are engaged in the uneasy, unsettling second stage, transition (Connelly, 2014), of the organizational change process. At the outset of this research project, my intention was to gather SD33 secondary teachers’ accounts of their experiences with the integration of technology in the day-to-day milieu of the teaching experience. Perhaps what emerged as the most significant outcome of this research paper is change is not purely about policies, procedures, plans, and their implementation or the technology tools alone, rather it is the interplay of teachers in relation with the contextual constructs of organizational factors and culture that is vital to the possibilities and opportunities of transformational technology as an agent of change. This final chapter provides a synopsis of the study, recommendations intended to assist educational leaders and administrators with the diffusion of technology throughout the system while responding to the needs and concerns of teachers who implement curriculum and engage students in learning, and culminates with suggestions for further research.

Although the scope of this study did not encompass all SD33 secondary teachers’ experiences, it did provide information on the lived experience of ten teachers which was relevant to educational reform and correlated to existing theories of behavioural intention, use behaviour, and importantly organizational change. The Transformational Technology Innovation Process model provided a framework to illustrate and explain the interconnectivity of technology, contextual environment constructs, as well as teachers’ acceptance and adoption of technology.
Through data analysis, the findings revealed teachers’ in this study recognized technology is affecting change in society in both negative and positive ways. Furthermore, it is a powerful agent of change within the educational environment that requires “digital wisdom” (Prensky, 2009a) if it is to be positive and meaningful change. Teachers’ perceptions of the normative and subjective components of the contextual environment in conjunction with beliefs, values and attitudes formed regarding technology affected behavioural intention and use behaviour. Organizational factors generally inhibited technology use. Demands/expectations such as those touched upon in the Education Plan (British Columbia, 2011), are viewed as transient or with the case of district and school level demands ‘forced’ with no valuable explanation or practical application provided. Teachers considered the professional development ineffective and technology support unreliable and inconsistent. The situational culture of teaching within the BC education system and personal experience of study participants was dualistic in nature, both individualistic and somewhat collaborative. Peer support emerged as a key factor in the acceptance and ongoing adoption of technology in teaching practices. Formal efforts focused on educational reform through the Education Plan (British Columbia, 2011) and various other provincial and national reports and plans lacked clear visions for the practical implementation of technology teachers are seeking.

In relation to the acceptance and adoption of technology, this study determined teachers’ feel pressure, from both society and stakeholders within the education system, to accept the changes to their role in the classroom deemed appropriate for the digital era. Teachers’ primary focus and willingness to adapt rested in their desire to do what is best for the student. Most teachers recognized this required acceptance of technology necessitating innovation in their
teaching practices. While teachers widely accepted technology in their personal lives, mixed beliefs and attitudes of professional use illustrated uncertainty on how to effectively incorporate technology as well as the value/benefit to students and their teaching practice. Finally, in comparing adoption data in the form of LoTI (Moersch, 2010) and diffusion of innovation categories, teachers may be accepting technology in a typical diffusion pattern according to Rogers (1962, 2003) model; however, the level of innovation is inhibiting transformation through technology.

**Recommendations**

In conducting this study and based on analysis of data contributed by 34 SD33 teachers, the following is recommended:

**Educational leaders to provide clear vision of desired change**

In order to stimulate change, educational leaders must provide all system stakeholders with a clear vision of desired outcomes in precise and measurable terms. In answering the ‘why’ question, teachers must be provided with compelling reasons that highlight the benefits to student engagement and success. In answering the ‘what’ question, provision of practical strategies specific to grade and subject and that incorporate digital wisdom will provide a concrete real-world vision of implemented change. Without a clear vision of how to implement provincial education plans in relation to diffusing technology throughout the system, teachers may not see the value or possibilities of use.

**Cultivate a positive and collaborative culture**

Educational leaders need to communicate genuine concern for those in the school system including administrators, teachers, and support staff. At the school level, build a collaborative
culture focused on shared team efforts. This requires deliberate staff team building efforts and willingness by all to engage in collaborative practices.

**Offer appropriate and effective professional development**

Relevant, targeted, timely and meaningful professional development will aid in dispelling uneasiness and hesitancy to innovatively implement technology. Provide district wide small group grade and subject specific specialists, professional development in ongoing, relevant, hands-on experience transferable to classroom application. Provide general technology application training to recognized innovators who in turn can subsequently disseminate knowledge and skills through informal and formal peer collaboration within their school sites.

**Provide time for learning and implementation**

Providing time for practice with newly learned technology and skills will improve teachers’ self-efficacy positively affecting behavioural intentions and use behaviour. Particularly initially, implementation of desired high levels of innovation that requires changes to teaching practice necessitates preparation time.

**Provide time for peer collaboration**

Peer support and collaboration are significant determinants in technology adoption. Offering time and support for meaningful peer collaboration provides teachers with relevant and targeted professional development while fostering a positive and collaborative culture and a sense of responsibility to the collective team.

**Improve access and reliability of technology**

Faulty and unreliable infrastructure diminished teacher interest and usage. Ensuring consistent accessibility and reliability of technology would improve acceptance and adoption of
As well, increasing accessibility to mobile technology provides the flexibility computer labs do not; mobile technology can easily be transported and utilised in a variety of classroom and learning environments.

**Suggestions for Future Research**

As this study was limited in scope, it acts as a starting point for future research. It raises questions that if answered would provide greater understanding of the process of educational reform.

1. This study determined the process of educational reform is in progress and revealed factors inhibiting or limiting change. Recommendations to support ongoing positive change were proffered. Future research should consider the total learning environment and determine what supports are required by students, parents, administrators, and support staff for successful educational reform integrating transformational technology?

2. This study established the Transformational Technology Innovation Process model to illustrate the interconnectivity of technology, the contextual environment, and teachers’ acceptance and adoption of technology. Beyond this study’s focus of SD33 secondary teachers, could future wider research in various contexts on teachers’ acceptance and adoption of technology support this model?

3. In this study, I examined SD33 secondary teachers’ acceptance and adoption of technology in their teaching practice and the factors, whether personal, institutional or systemic, that impeded or supported teachers’ behavioural intention and use behaviour. Would the lived experience of other SD33 teachers corroborate this
study’s results or provide a broader picture that would assist in establishing more precise recommendations to aid in organizational change?

4. Through this study, I determined organizational factors in correlation with teachers’ values, beliefs, attitudes, and self-efficacy support or inhibit the acceptance and adoption of technology. Desire for meaningful professional development and ongoing peer collaboration emerged as key factors in behavioural intention and use behaviour. Is determining best practices in the integration of technology specific to grade and subject areas necessary to develop appropriate professional development?

5. Rogers’ (1962, 2003) diffusion of innovation theory was utilized in analysing teachers’ timeframe of adoption. Could this theory be adapted to better reflect the teacher experience taking the contextual environment into consideration?

6. This study situated the teachers’ experience within the educational landscape and a lack of knowledge and negative attitude towards the Education Plan (British Columbia, 2011) emerged. To what extent has negative/positive attitudes towards educational policy hindered/supported educational reform? Why do teachers’ have these attitudes? What is the underlying foundation of teachers’ perceptions that influence or result in these attitudes? Future research should seek to answer these questions in order to inform effective practices in the dissemination of policies and plans thereby garnering improved support from teachers.

Conclusion

This study examined SD33 secondary teachers’ acceptance and adoption of transformational technology and the factors that support or inhibit their practice. Information
was collected via survey and in-depth interviews, analysed, and presented in relation to the Transformational Technology Innovation Process model created specifically to understand the teachers’ experience in this study. Viewed from an organizational perspective, it would appear the education system is in a state of change. The uneasiness, confusion, and questioning teachers are experiencing are normal facets of the transition stage of the organizational change process. While researchers (Wozney, Venkatesh, & Abrami, 2006; Becker, 2006; Zhao & Frank, 2003) have found, frequent, meaningful and effective integration of technology is atypical, it is important to iterate, change is a process not an event (Rogers, 1962). This process requires changing behaviour and addressing the concerns of teachers during the integration of the technology into teaching practice and providing the supports needed to create the necessary environment that would allow transformational technology to flourish as an agent of change. Shared experiences in this study can serve to guide the ongoing transformation by providing insight into support desired by teachers. The key to successfully navigate the process of change rests within the hands of educational leadership providing a clear vision that goes beyond theories to include practical hands-on application in the day-to-day teaching practices and experiences for students. System supports must reflect the needs of teachers, the frontline implementers of the envisioned future of education.
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Appendix A

Shifting Minds: Seven Guiding Principles (C21 Canada, 2012, p. 4)

Principle 1
All Canadians have a universal right to reach their full learning potential and to have a voice in their learning needs.

Principle 2
The primary focus of Canadian education is to position learners for fulfillment and success in the modern world.

Principle 3
Literacy, numeracy, science, life skills and 21st Century competencies must now be the foundational learning outcomes of Canada’s public education systems.

Principle 4
Instructional, assessment practices and learning environments must be modernized to personalize the learning experience and better engage Canadian students.

Principle 5
Personalized access to teachers highly skilled in 21st Century learning skills and research-based learning environments is a universal right of every Canadian learner.

Principle 6
Public education is a community and societal enterprise where all Canadians share both the responsibility for and benefits of providing high quality and modern learning opportunities.

Principle 7
Canadians must engage in and support their education leaders in offering today’s students – creative, innovative, authentic, dynamic and modern learning experiences and environments.
Appendix B: Research Study Invitation Email

Dear Colleagues,

Title of Study: Technology Acceptance and Adoption in the Chilliwack Public Secondary Classroom

Master’s Student Principal Investigator: Cheryl Tourand, Student, MA Learning and Technology (MALAT), Royal Roads University

Thesis Supervisor: Dr. Elizabeth Childs, Associate Faculty, Royal Roads University
Dr. Bill Muirhead, Associate Provost, University of Ontario Institute of Technology

I, Cheryl Tourand, MALAT student from the School of Education and Technology, Royal Roads University, invite you to participate in a research project entitled, Technology Acceptance and Adoption in the Chilliwack Public Secondary Classroom

On a pan-Canadian scale, the education system is poised for a potential pedagogical shift. In the evolving educational frameworks, digital literacy and competency are not only essential for learner engagement but also skills and knowledge demanded by the digital era and evolving global social and economic realities. Provincial and national visions provide a basis for potential changes to the education system; as well identify potential challenges that must be overcome. Integration of educational technology is emphasized as a key factor in education system transformation. There is a shared responsibility and agency by educational stakeholders related to the use of educational technology. This study seeks to gather data on School District #33 Chilliwack (SD33) secondary teachers’ acceptance and adoption of technology in their teaching practices and the determinants/factors that support or inhibit their attitude and behaviour.

The expected duration of the entire study is September 2013 to June 2014; however, participants’ involvement would take place through the months of October and November. Should you choose to participate, you will be asked to complete one online or paper-based survey which would require approximately 15 to 20 minutes of your time. Participants may also volunteer to participate in an in-depth interview requiring 30-45 minutes of your time. Interviews will be conducted during the month of November.

This research is intended to give all teachers a voice, to share experiences and feedback as experts who are required to implement educational plans, strategies, and policies. In completing the survey or through the interviews, best practices may be shared and thereby enhance the teacher professional learning community. As such, this research has the potential to instigate transformation in policy and teaching practice.
If you are interested in participating, please read the attached Research Participant Information and Consent Form after which, if you consent to the research study conditions, please copy, paste, and answer the following questions in an SD33 email to me (see contact info below).

1. What is your name?
2. What is the name of your school?
3. Are you willing to participate in this study with the understanding that identifying data will be stored separately from all other data supplied by you for the purpose of the study? (Yes / No)
4. Would you prefer to complete an online survey or paper-based survey?

If you have any questions and/or concerns about this study prior to participating or throughout the study process, please contact the researcher in one of the following methods:

Researcher’s Name: Cheryl Tourand
Mailing address: 

Work number: 
Work email: 

Should you require confirmation of the validity of the research study, please feel free to contact the key contact thesis supervisor, Dr, Elizabeth Childs or Royal Roads University program administrator to confirm my participation in the thesis route of the MALAT program.

Thesis Supervisors: Dr. Elizabeth Childs
Associate Faculty
Mailing address: 
Phone number: 
Work email: 

Thank you,

Cheryl Tourand
Student, MALAT, Royal Roads University
GWG Work Phone Number: (xxx)xxx-xxxx local xxx
Email: 

This study has been reviewed and received ethics clearance through Royal Roads University`s Research Ethics Board (TBD: ethics file number)
Appendix C: Research Participant Information and Consent Form

Research Participant Information and Consent Form:

Technology Acceptance and Adoption in Chilliwack Public Secondary Classrooms

1. Explanation of the Research
On a pan-Canadian scale, the education system is poised for a potential pedagogical shift. In the evolving educational frameworks, digital literacy and competency are not only essential for learner engagement but also skills and knowledge demanded by the digital era and evolving global social and economic realities. Provincial and national visions provide a basis for potential changes to the education system; as well identify potential challenges that must be overcome. Integration of educational technology is emphasized as a key factor in education system transformation. There is a shared responsibility and agency by educational stakeholders related to the use of educational technology. This study seeks to gather data on School District #33 Chilliwack (SD33) secondary teachers’ acceptance and adoption of technology in their teaching practices and the determinants/factors that support or inhibit their attitude and behaviour. For the purpose of this study, you are being asked to participate in a singular online survey which will require 15-20 minutes of your time. You must be a BC public school K-12 certified practicing teacher.

2. Your Rights to Participate, Say no, or Withdraw
Your participation in this research project is completely voluntary and therefore you have the right to say no. If you decide to participate, you may change your mind at any time and withdraw from the study and will not be required to provide a reason for your decision. During completion of the online or paper-based survey, you may select to not answer specific questions or stop at any point in time. Using the unique identification number provided to you will make it possible to remove any data you may have submitted/contributed to date. Your anonymity and confidentiality is ensured. All identifying data will be stored separately and destroyed upon completion of the study or at the point of withdrawal should you decide to do so.

3. Contact Information for Questions & Concerns
If you have any questions and/or concerns about this study prior to participating or throughout the study process, please contact the researcher in one of the following methods:
Researcher’s Name: Cheryl Tourand
Mailing address:

Work number:
Work email:
Should you require confirmation of the validity of the research study, please feel free to contact the thesis supervisor or Royal Roads University program administrator to confirm my participation in the thesis route of the MALAT program.

Thesis Supervisors: Dr. Elizabeth Childs  
Associate Faculty

Mailing address:  
Phone number:  
Work email: 

Education Programs Program Coordinator:  
Robynne Devine

Mailing address:  
Phone number:  
Email:  

4. Documentation of Informed Consent
Voluntary agreement to participate in the research study is indicated by replying to this email and providing your name, email address and confirmation that you are willing to participate in this study and understand that identifying data will be stored separately from all other data supplied by you for the purpose of the study. Taking part in the online or paper-based survey is further confirmation of your voluntary agreement to participate and your informed consent.
# Appendix D: Levels of Technology Implementation

## Table 3

Levels of Technology Implementation (Moersch, 1996/97, p. 42)

<table>
<thead>
<tr>
<th>Level</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Non-use</td>
<td>A perceived lack of access to technology-based tools or a lack of time to pursue electronic technology implementation. Existing technology is predominantly text-based (e.g., ditto sheets, chalkboard, over-head projector).</td>
</tr>
<tr>
<td>1</td>
<td>Awareness</td>
<td>The use of computers is generally one step removed from the classroom teacher (e.g., integrated learning system labs, special computer-based pullout programs, computer literacy classes, central word processing labs). Computer-based applications have little or no relevance to the individual teacher's instructional program.</td>
</tr>
<tr>
<td>2</td>
<td>Exploration</td>
<td>Technology-based tools serve as a supplement to existing instructional program (e.g., tutorials, educational games, simulations). The electronic technology is employed either as extension activities or as enrichment exercises to the instructional program.</td>
</tr>
<tr>
<td>3</td>
<td>Infusion</td>
<td>Technology-based tools, including databases, spreadsheets, graphing packages, probes, calculators, multimedia applications, desktop publishing applications, and telecommunications applications, augment isolated instructional events (e.g., a science-kit experiment using spreadsheets/graphs to analyze results or a telecommunications activity involving data-sharing among schools).</td>
</tr>
<tr>
<td>4</td>
<td>Integration</td>
<td>Technology-based tools are integrated in a manner that provides a rich context for students' understanding of the pertinent concepts, themes, and processes. Technology (e.g., multimedia, telecommunications, databases, spreadsheets, word processors) is perceived as a tool to identify and solve authentic problems relating to an overall theme/concept.</td>
</tr>
<tr>
<td>5</td>
<td>Expansion</td>
<td>Technology access is extended beyond the classroom. Classroom teachers actively elicit technology applications and networking from business enterprises, governmental agencies (e.g., contacting NASA to establish a link to an orbiting space shuttle via the Internet), research institutions, and universities to expand student experiences directed at problem solving, issues resolution, and student activism surrounding a major theme/concept.</td>
</tr>
<tr>
<td>6</td>
<td>Refinement</td>
<td>Technology is perceived as a process, product (e.g., invention, patent, new software design), and tool to help students solve authentic problems related to an identified real-world problem or issue. Technology, in this context, provides a seamless medium for information queries, problem solving, and/or product development. Students have ready access to and a complete understanding of a vast array of technology-based tools.</td>
</tr>
</tbody>
</table>

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### Appendix E: Levels of Teaching Innovation Framework

<table>
<thead>
<tr>
<th>Level</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Non-use</td>
<td>Instructional focus ranges from a direct instruction approach to a collaborative, student-centered learning environment. The use of research-based best practices may or may not be evident, but those practices do not involve the use of digital tools and resources.</td>
</tr>
<tr>
<td>1</td>
<td>Awareness</td>
<td>Instructional focus emphasizes information dissemination to students using lectures or teacher-created multimedia presentations. Teacher questioning and student earning typically focus on lower cognitive skill development. Digital tools and resources are used for curriculum management tasks, to enhance lectures, or as a reward for students who complete class work.</td>
</tr>
<tr>
<td>2</td>
<td>Exploration</td>
<td>Instructional focus emphasizes content understanding and supports mastery learning and direct instruction. Teacher questioning and student learning focus on lower levels of student cognitive processing. Students use digital tools for extension activities, enrichment exercises, or information-gathering assignments that generally reinforce lower cognitive skill development. Students create multimedia products to demonstrate content understanding in a digital format that may or may not reach beyond the classroom.</td>
</tr>
<tr>
<td>3</td>
<td>Infusion</td>
<td>Instructional focus emphasizes higher-order thinking (application, analysis, synthesis, evaluation) and engaged learning. Teacher-centered strategies include the concept attainment, inductive thinking, and scientific inquiry models and guide the types of products the students generated. Students use digital tools and resources to carry out teacher-directed tasks that emphasize higher levels of student cognitive processing.</td>
</tr>
<tr>
<td>4</td>
<td>Integration</td>
<td>Students are engaged in exploring real-world issues and solving authentic problems using digital tools and resources, but the teacher may experience classroom management or school climate issues, such as lack of support from colleagues, that restrict full-scale integration. Teachers rely on prepackaged materials, assistance from other colleagues, or professional development workshops. Emphasis is on applied learning and the constructivist, problem-based models of teaching that require higher levels of student cognitive processing and in-depth examination of the content. Students use digital tools and resources to investigate student-generated questions that dictate the content, process, and products embedded in the learning experience.</td>
</tr>
</tbody>
</table>

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4a Integration (routine) Students are fully engaged in exploring real-world issues and solving authentic problems using digital tools and resources. Teachers are within their comfort levels promoting inquiry-based models of teaching that involve students applying their learning to the real world. Emphasis is on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and issues resolution that require higher levels of student cognitive processing and in-depth examination of the content. Students use digital tools and resources to investigate student-generated questions that dictate the content, process, and products embedded in the learning experience.

5 Expansion Students collaborate beyond the classroom to solve problems and resolve issues. Emphasis is on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and collaborations with other diverse groups, such as people from another school, another culture, a business, or a governmental agency. Students use digital tools and resources to answer student-generated questions that dictate the content, process, and products embedded in the learning experience. The complexity and sophistication of the digital resources and collaboration tools used in the learning environment are now commensurate with the diversity, inventiveness, and spontaneity of the teacher’s experiential-based approach to teaching and learning and the students’ level of complex thinking (analysis, synthesis, evaluation) and in-depth understanding of the content experienced in the classroom.

6 Refinement Students regularly collaborate beyond the classroom to solve problems and resolve issues. The instructional curriculum is entirely learner-based. The content emerges based on the needs of the learners according to their interests, needs, and aspirations and is supported by unlimited access to the most current digital applications and infrastructure available. There is no longer a division between instruction and digital tools and resources. The pervasive use of, and access to, advanced digital tools and resources provides a seamless medium for information queries, creative problem solving, student reflection, and product development. Students have ready access to, and a complete understanding of, an array of collaboration tools and related resources.
Appendix F: Online/Paper-based Survey Questions

Demographic Information: (Descriptive Statistical Analysis Data)

1. Unique identification number: ____________________________
2. Age: ________
3. Gender: ________
4. Number of years teaching: ________
5. Subject area(s): ____________________________
6. What grade level do you teach? (Check off all those that apply.)
   □ Grade 10
   □ Grade 11
   □ Grade 12
7. What is your highest level of education?
   □ Bachelor Degree
   □ Professional Certification
   □ Post Graduate Diploma
   □ Masters
   □ PhD
   □ Other (Specify: ____________________________)

Questions focused on acceptance of technology, adoption of technology in teaching practices and job duties, and internal/external supportive and inhibitive determinants.

Societal/Cultural (subjective norms – determinants, social influence)

8. How do you define technology?
9. In general, do you believe technology has improved things? If so, how?

Personal Component – beliefs, values, attitudes, computer self-efficacy

10. What do you like about technology? What do you dislike about technology? (Values)
11. What role does technology play in your personal life? Do you use a computer, tablet, or smart phone at home? (Acceptance)
12. What role does technology play in your professional life? (Acceptance, Attitude)
13. Do you believe technology can assist you in performing your job duties as a teacher and/or improve your ability to perform your job duties? If so, how? (Beliefs)
14. What prompted you to start using technology in your teaching practice? (Determinants)
15. How do you come to adopt new technology? Explain and provide examples. (Adoption, Perceived Usefulness & Ease of Use)

For example,

- Do you enjoy being on the leading edge, the first one to be experiencing the trial and error process of integrating new technology?
- Are you a leader amongst your peers who seek out your approval by observing your adoption of a new idea or innovation?
- You are not the first to adopt new innovations but are deliberate in doing so seeing that a few others have successfully done so?
- Do you wait until most of your peers have adopted an innovation before giving in to pressure do so yourself despite being initially skeptical about the innovation?
- Or, are you skeptical about innovation and those that initially adopt innovation? Do you wait until an innovation is well-established before doing so yourself or possibly not adopt innovations?

16. Has technology altered the way you teach in the classroom and/or the way you engage in your job duties? How? (Adoption, Computer Efficacy)

17. What technological tools (software & hardware) do you use? Do you feel confident using them? (Adoption)

School Organizational Culture (organizational determinants for Acceptance & Adoption)

18. What technology does your school provide to you for use in your teaching practice? What technology do you personally provide for use in your teaching practice? (Determinants: Organizational Support)

19. What continues to influence your use of technology in your teaching practice? (Determinants: Social Norms, Organizational Support, Computer Efficacy)

20. How are you being supported with the adoption of technology in your teaching practice? How would you like to be supported in your adoption of technology into your teaching practice? (Determinants: Social Norms, Organizational Support, Computer Efficacy)
Appendix G: In-Depth Interview Questions

Initial questions for in-depth semi-structured interviews have been developed and are listed below; however, questions may be altered, added or eliminated depending upon data obtained through the survey, the initial research instrument.

Ice breaker Questions:
1. Unique identification number: ________________________________
2. How long have you been teaching in your current school? In the District?
3. What has been your favorite teaching assignment in your career so far?
4. Describe your teaching experience?

Societal/Cultural (subjective norms – determinants, social influence)
1. In general, do you feel there is social pressure for people to use technology? Do you feel there is social pressure to use technology in your teaching practice and job duties? If so, from who? Please describe your experience. (Use behaviour: Perceptions of external control, voluntariness, experience, output quality)
2. In what ways is computer literacy required for individuals to be participating members of society? (Beliefs, attitudes, perceived usefulness)
3. What is your role as a teacher in relation to technology? (Behavioural intention & use: Values, beliefs, attitudes)
4. What do you know about the BC Education Plan in relation to the fifth pillar, “Learning Empowered by Technology”? (Job relevance, perceptions of external control)

School Organizational Culture (organizational determinants for Acceptance & Adoption)
5. In general, how would you describe your school’s culture? Is it collaborative or individualistic in nature? Describe. (Normative component)
6. What support do you receive from your district staff/administration, school administration, and peers to integrate technology into your teaching practices? (Normative component leading to adoption)

Personal Component – beliefs, values, attitudes, computer self-efficacy
7. Describe your teaching philosophy, teaching style, and the teacher’s role in the classroom. (Beliefs, values, attitudes)
8. In general, what role do you believe technology plays in our society? (Beliefs)
9. What role do you believe technology plays in the classroom? (Behavioural intention)
10. How do you integrate technology into your teaching practice? Provide descriptions of how you use technology. (Use behaviour)
11. Do you feel prepared to select and use technology in your teaching practice? Why or why not? (Computer self-efficacy)
Appendix H: Coding Scheme

**Category: Acceptance**
- Code: PERCEIVED USEFULNESS
  - Subcode: PERCEIVED BEHAVIOURAL CONTROL
  - Subcode: EFFORT EXPECTANCY
- Code: PERCEIVED EASE OF USE
  - Subcode: PERCEIVED PERFORMANCE EXPECTANCY
  - Subcode: EFFORT EXPECTANCY
- Code: COMPUTER SELF-EFFICACY
  - Subcode: ATTITUDE
  - Subcode: VALUES
  - Subcode: BELIEFS

**Category: Level of Teaching Innovation (Technology Adoption)**
- Code: NON-USE
- Code: AWARENESS
- Code: EXPLORATION
- Code: INFUSION
- Code: INTEGRATION (MECHANICAL)
- Code: INTEGRATION (ROUTINE)
- Code: EXPANSION
- Code: REFINEMENT

**Category: Supportive/Impeditive Factors**
- Code: SOCIAL INFLUENCES
- Code: SOCIETAL DEMANDS
- Code: ORGANIZATIONAL CULTURE
- Code: ORGANIZATIONAL EXPECTANCY
- Code: ORGANIZATIONAL STRUCTURE
### Appendix I: Participant Demographic Information

<table>
<thead>
<tr>
<th>ID#</th>
<th>Age</th>
<th># of years teaching</th>
<th>Subject(s) area</th>
<th>Highest level of education</th>
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<td>Masters</td>
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<td>23</td>
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<tr>
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<td>Home Economics, Foods,</td>
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<tr>
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<tr>
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<td>English</td>
<td>Masters</td>
</tr>
<tr>
<td>2013-CT129</td>
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<td>8</td>
<td>Social Studies, History, Geography, English</td>
<td>Masters</td>
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<tr>
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<td>2</td>
<td>English and Social Studies</td>
<td>Masters</td>
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<tr>
<td>2013-CT131</td>
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<td>Bachelor Degree</td>
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<tr>
<td>2013-CT133</td>
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<td>18</td>
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<td>Post Graduate Diploma</td>
</tr>
<tr>
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<td>3</td>
<td>Special Education</td>
<td>Professional Certification</td>
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<td>2013-CT135</td>
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<td>27</td>
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<td>Post Graduate Diploma</td>
</tr>
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</table>