Technology Integration in Ontario Elementary Schools

By

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Abstract

Technology has become an increasingly necessary tool for human activity, causing changes in routines and practices (Mishra & Koehler, 2006). Despite an increasing amount of money spent on technology by school boards, there is a lack of understanding about what teachers require in order to effectively integrate technology in classrooms. This qualitative study aimed to elucidate if elementary teachers were utilizing technology in ways that were conducive for student learning. Rather than focusing on the types of technology utilized, this study examined how technology was integrated into school systems. Effective integration was examined through teachers’ perspectives, and their challenges and successes. Data was derived from semi-structured interviews with two Ontario elementary educators. Four themes emerged from the findings of this study: Teacher training on technology use and integration, teacher attitudes towards technology, challenges with integrating technology, and the importance of digital citizenship when integrating technology. Although in general, teachers have positive attitudes toward technology, findings suggest there is a lack of training and support for teachers to effectively integrate technology within the classroom and in return enhance student learning.

Key Words: Technology, education, professional development, teacher attitude
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Chapter 1: Introduction

1.0 Introduction: Research Context

The advancement of technology in Canada is changing the life of schools—“it plays an increasingly important role in teaching and learning” (Chen et al., 2014, p. 1). Specifically, in Ontario, there has been a number of great initiatives in terms of implementing technology within schools over the past few years. This is largely due to numerous studies, showing benefits from the use of technology in education. The article by Devlin et al., (2013) mentions that according to Gulek and Demirtas (2005), “there is substantial evidence that incorporating technology, of any kind, in the classroom as an instructional tool enhances student learning and educational outcomes” (p. 2). Devlin et al., further mentions that “numerous studies (Gulek & Demirtas, 2005; Spires, Lee, Turner, & Johnson, 2008; Edwards, 2007) have found that using any technology with students” (Devlin et al., 2013, p. 2) is able to have profound advantages such as it “boosted both concentration and engagement” (Devlin et al., 2013, p. 2). Due to the wide variety of educational technologies, “there is no single research study out there which may address the general question of whether technology yields improved student outcomes” (Appalachia Regional Comprehensive Center, 2013, p. 1). Nonetheless, there is an ample amount of evidence which suggests that particular technologies have the ability to enhance student knowledge and skills. For example, a recent meta-analysis conducted by Cheung and Slavin (2012) compares the impact of various technologies on K-12 reading achievements. Results demonstrate that comprehensive models of reading programs that integrate computer-assisted instruction with other activities resulted in the greatest improvements in reading scores (Cheung & Slavin, 2012). Furthermore, in another meta-analysis conducted by Cheung and Slavin (2011), on K-12 mathematics computer applications, findings reveal that such programs result in
significant achievement in mathematics. Specifically, programs that carry out traditional math instruction with additional computer-assisted instruction catered at students’ levels of need, have the greatest effects on math achievement (Cheung & Slavin, 2011). Furthermore, participation in one-to-one projects wherein each student is given a digital device have been demonstrated to improve student motivation and engagement in learning, slightly improved student writing skills and proficiency with the use of digital tools (Fleisher, 2012). However, other research studies on one-to-one projects show that “the excitement that computers generate, along with the freedom Internet connectivity allows, can lead to off-task behaviors” (Storz & Hoffman, 2013, p. 4). In addition, nearly 40% of teachers “believed that it has become harder for their students to concentrate in class after receiving the laptops, because the students were distracted by the Internet, e-mails, games, music and so on” (Storz & Hoffman, 2013, p. 4). The analysis by Lee and Spires (2009) noted difference between in-school and out-of-school computer use. They demonstrate that students may be experienced and skillful with the personal, and social uses of computers that they experience outside school but lack knowledge in research-related activities or word processing (Lee & Spires, 2009). This brings an important point to be considered when incorporating technology into education and as such the basis of this paper. That is educational technologies is only able to improve student achievement, so long as these tools are integrated thoughtfully into teaching and student learning. Hence, it is only when technology is incorporated meaningfully that teachers will have an opportunity to enhance student learning and achievements.

Broadly speaking, the International Technology Education Association (2007), defines technology as “how people modify the natural world to suit their own purposes” (p. 2). The document goes on to mention that “technology literally means the act of making or crafting, but
more generally it refers to the diverse collection of processes and knowledge that people use to extend human abilities to satisfy human needs and wants” (p. 2). Although there is no clear-cut definition for technology integration in schools, Hew and Brush (2007) point out that some researchers such as Cuban et al., (2001), viewed and understood it in terms of “types of teachers’ computer use in the classrooms: low-level (e.g., students doing Internet searches) or high-level use (e.g., students doing multi-media presentations, collecting and interpreting data for projects” (Hew & Brush, 2007, p. 225). Hew and Brush explains that for other scholars, such as Hennessy et al., (2005) technology integration was understood in terms of “how teachers used technology to carry out familiar activities more reliably and productively and how such use may be re-shaping these activities” (Hew & Brush, 2007, p. 225). Moreover, others viewed it as teachers using technology to develop and grow students’ thinking skills (Lim et al., 2003). In this paper, technology integration is thus viewed as the use of computing devices such as desktop computers, laptops, iPads, or Internet in elementary schools for instructional purposes.

1.1 Research Problem

In spite of research demonstrating the benefits of technology integration, its effective implementation by teachers has been met with some challenges. While information and computer technology (ICT) has considerable potential, it is also a major ongoing expense. Despite the presence of technology at schools, there are difficulties in terms of the network infrastructure and slow wireless access due to school budget (Chen et al., 2014). Furthermore, the extent to which teachers incorporate technology into their teaching and learning varies considerably—as technology is not a prerequisite to effective teaching. Teachers’ beliefs are important to consider when explaining why some teachers adopt computers in the classroom and others do not (Hermans et al., 2008). While some teachers may claim to have adopted a more
constructivist teaching belief, they may not be equipped or able to completely restructure their classroom practices as technological training is very limited. Hence, “the question is not whether to accept technology as a teaching and learning tool, but rather to what extent and in which ways technology can and should be used so that it is utilized effectively in the classroom” (The Learning Partnership, 2015, p. 1).

1.2 Purpose of the Study

The purpose of this study is to describe the challenges elementary teachers in Ontario face with integrating technology into their classrooms and how they integrate it into their pedagogy. In doing so, this paper will serve as a guide to those interested in implementing technological strategies in the classroom. In addition, the insights gained from this research study may encourage those who are reluctant to use technology to support learning to begin that journey. This study is important because there is a level of anxiety amongst some educators about integrating technology (Wood et al., 2008).

As a result of the challenges associated with the implementation of technology in Ontario schools and the potential that it holds in educating students in digital literacy and fostering student-centered learning, I intend to explore this relationship further. Therefore, the objective of this study is to describe Ontario elementary teachers’ perception on whether and how technological integration creates effective teaching and learning experiences for students. The results of this study will be useful to educators aiming to enrich classroom learning to enhance digital literacy skills of students. In addition, the implications of my research will be to provide insights and information to policy makers on how they can more effectively equip teachers to implementing technology in their classrooms as well as what supports should be put into place to accommodate teachers in their instruction with technology.
1.3 Research Questions

The principal question that I addressed in my research was: How can digital technology be more effectively integrated into elementary classrooms so as to enhance student learning?

Sub-questions:
1. How is technology currently being used in classrooms?
2. What technological plan is being used by the board as a means to guide and support the use of technology in schools?
3. What factors and challenges effect teaches attitude in the implementation of technology in the classroom?
4. How has pedagogy been enhanced through the use of technology?
5. What is the importance of teaching about digital citizenship?

1.4 Background of the Researcher

Being part of the 90’s generation, I was fortunate enough to grow up with technology from a very early age. My first interaction with a computer was my parent’s Dell desktop at a very young age of 7. My parents would always find me by listening to the clicking of the keyboard. According to my parents, I was glued to the screen, mesmerized by the different page colors each click and button would take me. My interest in technology is still there today. I like to explore various software applications and would use it when a school project came up.

Furthermore, since I am the youngest child in my family, I am called upon to fix the computer or provide support for technical problems that arise with cell phones, laptops, cameras or any other pieces of technology.

In my classroom experience as a teacher candidate, I have explored and incorporated technology at various times. It may range from a projector to smart board, tablets, laptops and
other devices to allow students to collaborate, research and practice content and skills taught in class. At any time, I incorporated technology into my lesson plans, I would always have a backup in case of technical failure, such as computer not starting up or addressing the issues of a very slow network. Similarly, my Associate Teachers (AT) would attempt to integrate technology whenever they had the opportunity to do so, however, due to slow Wi-Fi connection, they were repeatedly unsuccessful and hence would often time not bother to add a technological component to a lesson. As such, I find it difficult to implement technology in a school system in which the technological infrastructure is resulting in barrier to do so.

One view that I challenge is the use of technology for technology’s sake. There are various cases of when technology is being used in a manner in which it is hindering teaching and learning. Some cutting-edge tools may not be compatible with current equipment, not adaptable, takes too long to use effectively, or simply put, is not engaging to students (Gorder, 2008). I believe teacher education and professional development is very much needed for effective integration of technology in classrooms as a means to avoid technology being under-used or misused as a result of inappropriate training and experience.

1.5 Overview/Preview of Whole

To respond to the above mentioned research questions, I will be engaged in a qualitative research study using a sample of two teachers in the Greater Toronto Area (GTA) about their personal and teaching experience with regards to technology usage in the classroom. The introduction and purpose of the research paper will be contained in chapter 1, which will also include my own background and how it formed my research topic and interest. Chapter 2 will be the literature review in which the current research pertaining to this paper will be divided into three categories: Technology and education, teacher pedagogy, and digital citizenship. In
Chapter 3, I will introduce my participants and discuss the methodology and procedure utilized in this paper. Lastly, in Chapter 4 and 5, respectively, I will report the findings of my study and analyze these findings capturing themes connected to the literature and discuss implications of this study for my own teacher identity and practice and for the educational research community more broadly. I also articulate a series of questions raised by the research findings and point to areas for future research.
Chapter 2: Literature Review

2.0 Introduction

In this chapter, I review literature relevant to technology within education. I begin by looking into the traditional role of technology and then compare it to modern role of technology in education. Next, I review research on the implementation of the technology in terms of the narrative that is out there in relation to the reality and I consider specifically what is written in the curriculum documents regarding the implementation of technology within schools. Next, I look into the perspective of teachers with regards to technology integration and the types of training and challenges teachers face when implementing technology in their classrooms. Finally, I look into digital citizenship and the importance of promoting it in education.

2.1 Technology and Education

2.1.1 Traditional versus Modern role of technology in Education

Historical attempts to use technology in education have focused on “product technologies, such as teaching machines, educational televisions and films and most currently, computers” (Hooper & Rieber, 1995, p. 5). Traditionally, the focus of the classroom was more on the teacher, where “learning is viewed as a consequence of receiving the information through good instruction” (Hooper & Rieber, 1995, p. 5). The role of these product technologies were in how they supported the beliefs and practices of classroom teachers (Hooper & Rieber, 1995). In other words, from the traditional point of view, it served as a tool for the delivery of instructional lessons, just like teachers. Traditional methods have been greatly criticized for “failing to emphasize practical problem solving and critical thinking” (Hannafin & Land, 1997, p. 167). Learning methods which encourage reasoning, problem solving and critical thinking are thus needed. Student-centered learning environments have been touted as a means to support such
processes (Estes, 2004). In essence, “the cognitive demands shift from externally mediated selecting, processing and encoding during directed learning to individually anticipating, seeking and assessing relevance based on unique needs and goals” (Hannafin, 2013, p. 1). Technology has greatly influenced student-centered learning environments as now “individuals can uniquely define the purposes of technology’s use and exploit its capabilities to support individual interests and needs” (Hannafin & Land, 1997, p. 172). Furthermore, technology-enhanced student-centered learning environments provides individuals with a range of resources with which to “navigate and manipulate” (Hannafin & Land, 1997, p. 175). Hence, this provides student with “opportunities to seek rather than to comply, to experiment rather than to accept, to evaluate rather than to accumulate and to interpret rather than to adopt” (Hannafin & Land, 1997, p. 175). There is no doubt that traditional resources did not show students the reality of professional life (del Campo et al., 2012). Furthermore, traditionally, schoolwork primarily focused on remembering content taught and rarely on making information meaningful (del Campo et al., 2012). Learning becomes meaningful when external connections are made between new content which have been taught and what is already known (Hooper & Rieber, 1995). As such, the contemporary role of technology in education is to provide a more meaningful approach to learning. Since the focus of the classroom is more on the students, technology is used to help students build more personal interpretations of life (Hannafin, 2013, p. 1). For example, now there is a questionable need for a student to take notes in class, for students may attend or be absent from class, and be confident that there are good notes which may be downloaded easily from the web, at a convenient time at home. But do students really look at all the materials at their disposal? The students do not always print all information, which is beneficial for the environment, but can you study on a screen as well as on paper? (del Campo et al., 2012).
Contrary to the above, Cuseo et al., (2007), points out that research shows students that take better notes are the ones that achieve better grades. The process of taking notes by hand is better than taking notes on a laptop for remembering conceptual information over the long term (Mueller, 2014). Mueller (2014) reports that “new findings suggest that even when laptops are used as intended — and not for buying things on Amazon during class — they may still be harming academic performance” (Muller, 2014, p. 1). Moreover, there appears a direct relationship between test marks and seating distance from the front of the classroom (Marshall & Marshall, 2010). Marshall & Marshall (2010) demonstrates that students seated in the front receive higher grades. He goes on to mention that in particular, students seated in the front center rows specifically are the ones that attain higher grades (Marshall & Marshall, 2010). This may be in part “due to better vision of the blackboard, better hearing of what is being said, better attention to what is actually being said because there are fewer people between them and the instructor to distract them” (Cueso et al., 2007, p. 1). Furthermore, there is “greater eye contact with the instructor—which may increase their sense of personal responsibility to listen to and take notes on what their instructor is saying” (Cueso et al., 2007, p. 1).

Contemporary views of student learning are viewed as the active process of gathering, thinking, analyzing and synthesizing information and constructing meaning with what technology presents (Hooper & Rieber, 1995). The benefits resulting from the use of technology are greater student engagement and an enhancement of student’s technical skill set (Devlin et al., 2013, p. 2). Students can use technology as a tool to do their inquiry on a topic of interest and grow their critical thinking skills, instead of it being there and teaching the students about a topic (Devlin et al., 2013). Hence, technology is a learning tool to learn with as opposed to from? “Technology is now considered by most educators and parents to be an integral part of providing
high-quality education” (Ertmer & Ottenbreit-Leftwich, 2010, p. 257). Whereas in the past, the teacher was viewed as the knowledge provider, the current role in a technology-based classroom allows for teachers to be more of a facilitator, guiding students’ learning processes” (Ertmer & Ottenbreit-Leftwich, 2010). The question is not “whether to accept technology as a teaching and learning tool, but rather to what extent and in which ways technology can and should be used so that it is utilized effectively in the classrooms” (The Learning Partnership, 2015, p. 1).

2.2 Implementation of technology in schools: Theory versus Reality

New technological innovations are actively being incorporated into education. Integrating technology within the classrooms reinforces key technical skills students need to thrive and be successful in the 21st century (Ertmer et al., 2012). Elementary teacher, and blogger Bevin Reinen, emphasizes a major component that differentiates learning in the 21st, is the “movement away from passive acquisition of knowledge to socially-active learning” (Reinen, 2013, p. 1). While there is abundant recognition with regards to the importance of incorporating technology for today’s student and schools, there is limited data on “how—and how widely—technology is being used in Ontario schools” (Chen et al, 2014, p. 1). A survey conducted by People for Education (2013) of Ontario’s elementary schools reveals that in “99% of Ontario elementary schools, students have access to computers in school” (Chen et al., 2014, p. 1), with the “majority (96%) of students’ computer access being in classrooms” (Chen et al., 2014, p. 2). However, is the technology that is available in Ontario Elementary schools being distributed and used effectively? This is supported by the Kaiser Family Foundation Report which demonstrated that computer use starts for majority of the students in kindergarten (Rideout et al., 2003). In addition, they report that principals in 80% of Ontario elementary schools report students start using computers as an integrated part of their learning in kindergarten (Rideout et al., 2003). On
a teacher survey report conducted by ORION, one teacher cited the example of how in one instance, “one iPad was shared by an entire school” (ORION Nexus K-12 Teacher Survey Report, 2014, p. 5). Similarly, teacher blogger, Jean Montano writes that teachers are not implementing technology within their classrooms, “due to students not having equal access to technological resources” (Montano, 2013, p.1). She goes on to reason, “in reality, there will be students who don’t have iPads or laptops or even textbooks for class” (Montano, 2013, p. 1). Hence, the teacher has to point them in the direction of library or community resources, or to create assignments that allow students to work in groups and share resources. Such limitations ultimately reduce success to the integration of technology in schools.

Despite the presence of technology at schools, principals report many challenges including “deficiency of network infrastructure and slow or unstable wireless access” (Chen et al, 2014, p. 3). Schools contain outdated technologies in their classroom which cannot connect to local network or do so at extremely slow speeds (Chen et al, 2014). One teacher described having to “consider bringing storage devices such as SeaGate, into the classroom in order to allow students to view rich media content” (ORION Nexus K-12 Teacher Survey Report, 2014, p. 6). How are schools expected to be technology savvy when the infrastructure is not there? ORION, the company which provides Ontario boards with high-speed fiber optic network, conducted a survey in 2014 of 72 Ontario school boards. When asked to rate of their classroom access to the internet, only 22.5% of the teachers responded with “excellent” access to the internet, in relation to the 45% of teachers who responded with “good” internet access (ORION Nexus K-12 Teacher Survey Report, 2014, p. 5). Furthermore, percentage of teachers responding with “average” or “poor” internet access was 20.9% and 11.6% respectively (ORION Nexus K-12 Teacher Survey Report, 2014, p. 5). Hence, schools carry technology within it, however, with
poor or no access to the internet, online resources cannot be accessed and therefore it becomes an ineffective integration. Furthermore, many principals express concern over the cost of technology within their school budget (Chen et al, 2014). School boards are lagging in terms of providing greater budget for schools to keep up-to-date with technological innovations. Moreover, the survey conducted by ORION showed that as many as 60% of the teachers responded they had no control over the type of devices students were using (ORION Nexus K-12 Teacher Survey Report, 2014). The trends in the teacher’s responses demonstrated that the lack of digital tools and poor connectivity are obvious barriers in terms of allowing teachers to integrate technology effectively.

Recent research suggests that we have not yet achieved significant levels of effective technology use (Lim et al., 2013). “If and when technology is used, it typically is not used to support the kinds of instruction (e.g., student centered) believed to be most powerful for facilitating student learning” (Rideout et al., 2003, p. 256). There is no doubt that teachers have increased their personal and professional uses of computers. In fact, in response to the Speak Up 2007 Survey, majority of the teachers (93%) reported using technology to communicate with other teachers or parents (Project Tomorrow, 2015). Alongside these increases in teachers’ professional uses are increases in the reported instructional uses of computers in the classroom (Project Tomorrow, 2015). Unfortunately, when these data are looked upon in closer and in more detail, reported uses still tend to be small—that is, those that support traditional, teacher directed instruction such as using the PowerPoint to present a lesson, searching the Web for information resources (Maddux & Johnson, 2006). Furthermore, other reports suggest that only a small percentage of teachers actually “use technologies such as gaming or social networking, despite the fact that these forms of ICT are widely seen as holding significant pedagogical potential”
(Chen et al., 2014, p. 3). Hence, the reality of what is happening in Ontario schools significantly differs from what is being portrayed.

2. 3 The Curriculum Documents regarding implementation of technology in schools

Students are actively using technology in their daily lives. The pressure on schools to teach the skills necessary to prepare students for the future in this age of technology is growing as research studies in education demonstrate that the use of technology (e.g. computers) can “help improve students’ scores on standardized tests, improve students’ inventive thinking (e.g., problem solving) and improve students’ self-concept and motivation” (Hew & Brush, 2007, p. 2). Hence, digital literacy is crucial for the students’ success in adult life and therefore needs to be built in to students’ education on Ontario schools. The International Technology Education Association established a formal definition for technological literacy: “Technological literacy is the ability to use, manage, assess, and understand technology” (International Technology Education Association, 2000, p. 7). The Partnership for 21st Century Skills (2007) maintains that there is a gap between what students learn in school and the knowledge and skills they need for their future. With all the research favoring technology integration in classrooms, one would think that provincial and federal Canadian policymakers would be more stern with regards to designing and developing policies and strategies, plans and actions to put e-learning upfront in Canadian education. But are they doing this? “Canada is among the countries that share the vision of recognizing digital literacies as an important area of their competitiveness” (Chen, 2015, p. 4). In fact, Chen (2015) points out that the Government of Canada views the competency of using digital technology as one of the essential skills for the workplace (p. 4). However, because of Canada’s province-based jurisdiction, to date “there is no national policy on digital learning in place” (Chen, 2015, p. 4). As a result, policies and strategies of digital
learning solely depend on individual provinces and territories. “Changes are going to have to be made to keep pace with the global community” (Bloomstine, 2001). Chen (2015) argues that “ICT competencies have been included in the formal curriculum in Alberta, but only get briefly mentioned in Ontario’s curriculum standards, leaving local school boards defining ICT curricula on their own” (p. 4). The Education Act charges school boards with the “responsibility of providing programs and instruction for students according to section 169.2” (Council of Ontario Directors of Education, 2011, p. 1). Schools are compelled to integrate and use technology to “further student learning, influence teacher instruction and develop the technical skills that students can use in their daily life and future careers” (Council of Ontario Directors of Education, 2011, p. 1). Each board needs to have an approved “technology plan which guides, supports and directs the use of technology for the 21st century” (Council of Ontario Directors of Education, 2011, p. 2) in order to build engaging, media-rich learning experiences, enhance student-centered instruction and help develop the technical skills that students can use in their daily life and future careers (Council of Ontario Directors of Education, 2011). As such, the goal of the Toronto District School Board (TDSB) is “to utilize technology as a tool for teaching and learning for K-12 students” (TDSB ICT Standards, 2010, p.1). The TDSB specifies Standards for Information and Communication Technology (ICT) to be attained in preschools and spells out objectives such as “understanding the ethical, cultural and societal issues related to ICT, using ICT as a tool for assessing and processing information, communicating and collaborating using ICT, etc., to be fulfilled by the end of kindergarten” (Bose, 2011, p. 46). The inclusion of technology across the curriculum compels all teachers to “effectively plan for the integration of computers and information technologies into the teaching/learning process” (Martin, 2012, p. 269). Thus, “students are compelled to become familiar with a range of applications” (Martin, 2012, p. 269).
2012, p. 269). As there is an increased reliance on computers, telecommunication networks and information technology in society as a whole and in the workplace, it makes it essential for students to become computer literate. Likewise, since students are going to live and work in a technologically driven world, teachers are preparing students for future roles and occupations in society, by making them digitally literate. Therefore, the province needs a clear definition of the core capacities of digital literacy and an explicit strategy to ensure that every student has access to the opportunities to develop these capacities.

Technologies are playing an increasingly important role in driving innovations. “New ways of using and creating information and knowledge is made possible by the use of ICT” as opposed to using ICT for maintaining traditional practices (Kampylis et al., 2012, p. 7). ICT-enabled curriculum allows for “flexibility, personalization and different learning styles to be combined” (Kampylis et al., 2012, p. 7). In addition, learning can be “authentic, motivational and viewed as a social process” (Kampylis et al., 2012, p. 7). Dealing with ICT allows for a new way teachers and students can deal with a task. For example, “it can enable them to inquire and gather data in the field, thus changing the nature of the activity itself and fostering creative and critical thinking” (Kampylis et al., 2012, p. 7). The Toronto District School Board (TDSB) ICT Standards curriculum documents seeks to provide a framework in helping students demonstrate a “sound understanding of technological terms—making them digitally literate” and it provides an outline for “students’ use of appropriate technology”, as a means to “gather, evaluate and use data and information in order to conduct research inquiry safely” (TDSB ICT Standards, 2010, p. 4). When we look into the curriculum and policy documents, the “benefits of e-learning” category was “the most prominent theme in the documents, suggesting that e-learning has value as a viable educational tool” (Borokhovski et al., 2011, p. 11). Within the category of benefits of
e-learning, “the most frequently mentioned subcategories were flexibility/accessibility, meeting social demands, interactivity/communication and achievement” (Borokhovski et al., 2011, p. 11). Much of the documents contained references to several perceived benefits of e-learning such as “increased interest in the use of technology to meet learning and information needs” and to ensure that learning opportunities for student “are available when and where they are needed and can be accessed through a variety of means” (Borokhovski et al., 2011, p. 11). For example, the TDSB ICT Standards document provides the standards for which students can demonstrate “creative thinking, construct knowledge and develop innovative products and processes using technology” (TDSB ICT Standards, 2010). “Creative learning activities require meaningful contexts and ICT can offer tools for creating such context” (Kampylis et al., 2012, p. 7).

Technological tools can allow for the representation of information in a variety of ways that will allow the students to make any necessary adjustments, try out various ideas and approaches to problem solving. Hence, attention and efforts should therefore be focused on fostering teachers’ preparation for a pedagogy for creativity (Loveless, 2011). Although the TDSB ICT Standards documents outlines the above strands, it is written as though it is the same for all grades from K-12. The document does poorly in terms of specifying each strand based on grades. The same skill that is attained in grade four is to be attained in at grade six. Skills that are tailored at each grade level will provide a better framework and goal that teachers can utilize for effectively incorporating technology within their classroom. Thus, the ICT-enabled curriculum documents supports teaching and learning in the 21st century.

The “support for implementation” theme was second in frequency of occurrence in the documents (Borokhovski et al., 2011, p. 12). Within this theme, the use of online resources was cited the most. The subcategory of professional development was cited the second most often.
under this theme, “indicating that policy makers acknowledge and value teachers’ expertise and qualifications” (Borokhovski et al., 2011, p. 12). An example from the Ontario Ministry of Education document indicating e-learning implementation; “the e-learning strategy provides initial face-to-face professional development, as well as ongoing professional development online, for teachers and other school board staff…” (Ontario Ministry of Education, E-learning Ontario, p. 2). Likewise, the TDSB ICT Standards document provides suggestions to teachers for “ICT integration” with specific Ontario Curriculum (TDSB ICT Standards, 2010, p. 5). For example, every grade has three to five ICT Experiences. “ICT experiences are teaching and learning activities that involve ICT Skills which vary according to the category and grade” (TDSB ICT Standards, 2010, p. 5). The document does an excellent job in terms of providing experiences tailored to students’ grade level as well as teacher’s ICT experience. Moreover, the TDSB ICT Standards curriculum documents provide ICT integration resources such as “Unit Planning Templates” and “Professional Learning Guide” which “provides teachers the steps necessary as they begin to learn, plan, teach and share with ICT” (TDSB ICT Standards, 2010, p. 7). Moreover, the Ministry provides elementary school board teachers, various ways to teach Ontario’s curriculum and help their students succeed, through e-Learning (Council of Ontario Directors of Education, 2011, p. 1). Borokhovski et al., (2011) demonstrates that “there is consensus among policy makers in their positive perception of e-learning and its potential to benefit learners” (p. 18). Similar findings were reported by Abrami et al., (2006). However, since Canada does not have a comprehensive approach to e-learning in order to clearly articulate what it could and should accomplish, it is instead “consisted of loosely connected provincial, territorial and federal e-learning networks, education providers and targeted initiatives” (Borokhovski et al., 2011, p. 18). Hence the consequences of this type of “approach include
duplicated efforts, fragmented goals and objectives and sporadic and short-term initiatives” (Borokhovski et al., 2011, p. 18).

2.4 Teacher Pedagogy

2.4.1 Perspective of teacher in the use of technology

Teacher’s beliefs are a major influencing factor in many areas of education (Borg, 2003), and technology is not excluded from this influencing phenomenon. In fact, teachers’ beliefs have proved to be able to challenge government and school efforts to implement computer technology. Such beliefs have often served to be a deterrent in the use of computer technology in the classroom (Ertmer, 2005). Hermans et al., (2008) mentions that Fullan (2001) pointed out, “the perceptions of the actors involved in educational innovations are a critical factor in the success of an innovation” (p. 1500). Therefore, the view that teachers are to be considered the most crucial player in educational change is not surprising. It is stated that “past educational reforms have failed, due to the mismatch between the meanings attached to the innovation by those involved in the instructional process” (Hermans et al., 2008, p. 1500). In this respect, “the personal willingness of teachers to adopt and integrate innovations into their classroom practice seems to be of crucial importance” (Hermans et al., 2008, p. 1500). Teachers’ educational views, whether it be a constructivist belief or a traditional belief, act as an antecedent of computer use (Hermans et al., 2008). Teachers’ beliefs are significant in terms of explaining why some teachers may adopt computers in the classroom and other do not. For example, in a ‘traditional classroom,’ technology usually plays a supporting role, where the teacher may use technology to present a video, search the web for information or ask students to complete an online activity with questions, as a means to reinforce a concept taught in class. In contrast, within a constructivist classroom, technology plays a more integrated role, serving as a cognitive tool to facilitate
authentic student learning (Ertmer et al., 2012). As such, research has found that traditional teaching profiles are associated with low-computer use, whereas constructivist teaching profiles, in which students take an active role in learning, are associated with higher computer use (Hermans et al., 2008). Similarly, Andrew (2007) demonstrated that teachers with constructivist beliefs tend to use technology to support student-centered curricula and those with traditional beliefs used computers to support more teacher-directed curricula. Therefore, simply increasing computer access was not sufficient to change teachers’ technology practices. This was especially the case when the “increased access was not accompanied by a change in teacher pedagogical beliefs” (Ertmer et al., 2012, p. 424). In a similar study, Windschitl and Sahl (2002) found that teachers’ beliefs about the role of computers in education had a decisive impact on the success or failure of implementing technology. In addition, Windschitl and Sahl (2002) found that even if teachers abandoned the idea of implementing computer technology in the classroom, there was an after effect on their teaching practices, leading such practices to become more constructive as compared to before the use of computer technology in the classroom.

Technology changes the way teachers teach. It offers teachers effective strategies to reach out to various types of learners and assess students’ understanding through multiple means. Yang and Huang (2008) research findings suggests that inexperienced teachers struggled more to implement technology than did experienced teachers. Furthermore, they found the more computer literate teachers, to score higher in being more liable to cooperate with other teachers and being more capable of refocusing (Yang & Huang, 2008). That is, they were more adept at implementing and troubleshooting technology (Yang & Huang, 2008). Likewise, teachers who are already regular users of technology, have confidence in using technology within their classroom, perceive it to be useful for their personal work and for their teaching and plan to
extend their use further in the future (Cox et al., 1999). Teacher blogger, Timothy Huneycutt (2013) writes, “technology implementation within the classrooms will help equip students for the future”. This is because both the teacher and students are acquiring skills useful for the 21st century, such as “critical thinking and workplace skills they will need to be successful in their futures” (Huneycutt, 2013, p. 3). As a result, teachers are motivated to using technology as a tool, to allow for a greater student engagement, enrich student learning and make it more culturally relevant to the students. The study by Yang and Huang (2008) found that teachers holding more positive beliefs about technology were more likely to put more effort into integrating it. A study by Becker and Riel (2000) found that the more involved teachers were in professional activities the more likely they held teaching belief in line with constructivist learning theory. Therefore, these teachers can more effectively incorporate computer usage into their classroom, in comparison to teachers who are not involved in their professional community and hence not gaining up-to-date pedagogy on technology integrations and so forth. Such teachers are more likely to continue on their traditional methods of delivering content and directing instructions. Furthermore, Huneycutt (2013) writes in his blog that some teachers view technology as a tool to help keep student focused for longer periods of time. For example, students can use the computer to get access to a wide variety of information on the web, saving tremendous amount of time. This “time-saver” feature can keep students focused on a project for a much longer period of time than they would with books and paper resources” (Huneycutt, 2013, p. 1). Contemporary view of education is a step away from memorizing facts and figures and more about collaborating with others, solving abstract problems, establishing various forms of communication and leadership skills and improving productivity.
While more teachers claim to have adopted a more constructivist, students-centered teaching belief, they may not be ready, or able, to restructure their classroom practices. As noted by Hu et al., (2003), there are multiple key factors effecting teachers’ ability to transform their pedagogical belief into practice. They include the technology itself, the user, and the organizational context (Hu et al., 2013). What types of technology are teachers being exposed to? How much training is provided as a supplementary to the technology? What kind of motivation and support are teachers receiving? These are some questions which affect teachers’ ability to integrate technology. Computer teacher, John Spencer (2012) points out in his blog, that a teacher may not use technology within their classroom due to personal experience (Spencer, 2012). Certain teachers are simply comfortable with the instructional methods that they grew up with. Something as simple as a blog or social media may sound too much because they are different than what they have been used to. Several decades ago, such technology did not exist or were too expensive that it was out of reach of teachers (Himsworth, 2007). As a result, it will require teachers to move out of their comfort zone. Hence, some teachers limit the use of technology due to lack of comfort with computers and technology use (Roach, 2010). On a similar note, Himsworth (2007) found through a process of interviews, that only 20% of teachers are comfortable using technology within the classroom. Moreover, Spencer (2012) reasons that “some teachers may have never used these tools during their free time, and schools may not have implemented it in professional development, then these tools may seem strange” (Spencer, 2012, p.4). Since training is so limited, teachers need to use their own time trying to learn how to work the technology such as the smart boards. If it is not something they use regularly, and school organization is not providing support, then it is very likely these teachers will not use technology in their class. Moreover, some teachers may view it in the sense that since it is optional (Spencer,
2012), and they are not required to use it, then they do not need to. One can still be a good teacher and use no technology whatsoever. As a result, teachers’ perspective can greatly impact the usage of technology.

2.4.2 Teacher training on Technological Education

“The wide variation in teachers’ use of technology suggests there is an ongoing need for high quality professional development to help teachers, particularly those who are ‘digital natives’, use ICT to support learning where appropriate” (Chen et al., 2014, p. 10). While the technology may be an excellent tool, nonetheless, it may become useless and instead harmful if not used effectively. In other words, if a teacher does not know how to use the technology, and end up spending class time trying to troubleshoot the device, this may result in students to become disinterested and disengaged. Universities such as the University of Ontario Institute of Technology (UOIT), York, Brock and Ontario Institute for Studies in Education (OISE) offer teacher candidates a course on the integration of technology. For example, at OISE, “CTL7016, Integrating Technology into the classroom: Issues and Activities” is offered to teacher candidates (OISE, 2015). Jackson (2013) points out that school boards are quick to buy the newest technologies available but with no supplementary training. Shazia Mumtaz (2000) points out that Willis et al., (1996) draw together the main threads of what the research tells us today; “for example, that teachers have very positive attitudes towards the use of technology in education, but are far less confident about their ability to actually use the technology and do not think that their teacher training programs prepared them to use technology in innovative ways” (Mumtaz, 2000, p. 335). Also, that “teacher training faculties, although positive about IT, do not have a strong background in integrating that into teacher education courses they teach” (Mumtaz, 2000, p. 335). A study conducted by Yang and Huang (2008) aimed at understanding what attitudes
and behaviors teachers developed while striving to integrate technology in teaching. Findings suggest that inexperienced teachers struggled more to implement technology than did experienced teachers. This contradicts Lam’s (2000) findings about age, but at the same time, reinforces the importance of integrating technology in teacher education programs as done by Park and Ertmer (2008) in order to foster more familiarity and perhaps avoid the struggle that was revealed in Yang and Huang’s study.

As mentioned above, not all schools are technology friendly. As such, teachers need to be trained to teach in multiple ways as a means to meet the needs of all students and help them to meet and exceed the established standards. “Differentiated instruction applies an approach to teaching and learning so that students have multiple options for taking in information and making sense of ideas” (Hall, 2000, p. 1). In other words, it is a method of providing instruction that is effective for every individual learner in the classroom (Tomlinson & McTighe, 2006). The 21st century classroom is full of diverse learners who are on different levels academically and from various backgrounds, races and different genders. According to Tomlinson and Edison (2003), the teachers’ goal through differentiation is to teach in ways that enhance and reach the full learning potential of each student in their classroom, to bridge the gaps in the students’ learning and skills, and to help each learner grow as fully and as quickly possible. This approach requires “teachers to be flexible in their approach to teaching and adjusting the curriculum and presentation of information to learners” (Hall, 2000, p. 1) rather than expecting students to modify themselves. The constructivist theory proposes that teachers spend more time allowing students to construct their own meanings and understandings through learning activities and social interactions with peers (Lane, 2007). As stated by Lattuca (2006), constructivist theorists believe that learning occurs through being actively engaged in the learning process. In
differentiating instruction teachers create learning experiences based on each student’s need in which students use their strengths to create meaning and gain a better understanding of the curriculum (Tomlinson, 2003). Apart from using technology to enhance learning, local learning can be a way of enhancing student learning. “Local learning takes advantage of the natural, built and cultural amenities that exist in the community” (Kozak & Elliot, 2014, p. 3) just outside the school doors, often a short walk away. “Learning that takes place in local settings contributes to improved thinking and problem solving skills. Decision-making in authentic contexts is most relevant to learners” (Kozak & Elliot, 2014, p. 4). Furthermore, local learning “provides opportunities for active, experiential learning that contribute to positive emotions and long-term memory retention” (Kozak & Elliot, 2014, p. 4). There are three elements of the curriculum that can be differentiated: content, process and products (Levy, 2008). At first glance, differentiated instruction looks like an easy, practical way to reach the needs of all students in the classroom. However, there is much misunderstanding and unclear expectations surrounding differentiated instruction (Wormeli, 2005). Teachers are often unsure about what differentiation is and how to achieve a truly differentiated classroom. While teachers are aware of the differences among the students in their class, they are unsure how to address these differences (Tomlinson, 2003).

Effective preservice teacher training and professional development can be an effective method for teaching teaches to effectively implement differentiated instruction into their classroom. However, according to Hill (2009), professional development is often not beneficial to teachers because of the means in which it is delivered. According to Hill (2009), the professional development system for educators is, “broken” (p. 470). Teachers attend too much professional development on too many different topics. They are not given the time to practice what they are learning before they are being forced to attend yet another 20 professional development class in
which they will sit, listen, and possibly take notes (Dana & Hoppey, 2008). According to Dana and Hoppey (2008), this “crash diet” (p. 66) of professional development does not prove to be effective and does not provide teachers the differentiation they need to become better, more productive, and more efficient teachers. As Davis (2009) stated, the teacher training on differentiation must be more than a day- long workshop or motivational speaker. It should be an intensive, ongoing training that truly leads to teachers understating differentiation and alleviates the misunderstandings. Powell and Kalina (2009), states that for learning to have a deeper meaning to the student and for true learning to occur, learning should be constructed by experience. This means that teachers must use both social and cognitive constructivism to truly provide their students with the constructivist learning approach to learning. Cognitive constructivism is a personal process in which learning occurs within the person and pertains to how the individual person constructs his or her knowledge. Social constructivism ideas and learning are constructed through interactions with others such as the teacher and other students (Powell and Kalina, 2009).

2.5 Challenges Teachers face when Incorporating Technology

2.5.1 Distraction caused by technology in the classroom

Technology within the classroom poses various challenges for teachers. One of the main challenges teacher face as a result of technology in their classrooms is that it can be a big distraction in it of itself. Although technology can be harnessed for positive educational outcomes, recent research suggests that these same digital technologies can impair performance and distract learners if used inappropriately (e.g. Fried, 2008; Kraushaar & Novak, 2010). In fact, research indicates that using laptops in classrooms can distract not only its users, but also the other students in close proximity to the laptops (Fried, 2008). Bloomstine (2001) observes in his
research that students are often focused on the screens of their computers and therefore are often distracted and disengaged from classroom discussions and activities. He notes that, “What is interesting to point out is that SimCity involves options for participants to choose from, colorful graphics, an array of noises, and opportunity for two players. Students who were playing this computer game were glued to their computers” (Bloomstine, 2001, p. 38). Fried (2008) points out that Levine (2002) developed a method to integrate laptops into the classroom experiences and found the need to “instigate a laptop-up laptop-down system” (p. 907). During class discussions, students are told to close their laptops and pay attention, thus actively preventing students from using laptops during class discussions (Fried, 2008). He goes on to mention that “the orientation and visual nature of laptops, along with pop-ups, instant messages, movement and lighting of text, and even things like low-battery warnings, make laptops inherently distracting (Fried, 2008, p. 908). Many researchers and educators alike have been “advocating the use of software that will allow the instructor to monitor and control what students are doing with their laptops during class time” (Fried, 2008, p. 907). A potential disadvantage to technology integration in education may result in a generation of students that are only focused on the virtual world instead of the real world (Bloomstine, 2001). Teacher blogger, Jean Montano (2015), writes that teachers need to “identify specific projects, times during class, and specific intentions for allowing the use of technology in the classroom. Creating expectations and guidelines for the students and sticking to them, will be important for them in respecting your boundaries.” (p. 5). Hence, students need to learn to respect the environment they are in and this notion of respect will come about when teachers provide clear guidelines.

2.5.2 Lack of Technical Support
Although teachers may overcome their initial hesitation and anxiety of integrating technology, significant challenges still remain in terms of ensuring greater technical support (Technology & Education Reform, 1995). Technical support for teachers still needs to be improved. Pelgrum (2001) found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was “lack of technical assistance” (p. 173). Although some schools are able to make do with the help of a knowledgeable teacher volunteer or part-time services, such arrangements are often unsatisfactory (Technology & Education Reform, 1995). Teachers are attempting to incorporate technology in their classrooms and require technical assistance on demand. Without both good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT (Lewis, 2003). For example, if teachers are carrying out activities that requires technology, and there are frequent technical problems arising, making the teachers wait hours and days before it is resolved, then this will make the teachers abandon their efforts to incorporate technology. In Sicilia’s study (2006), technical problems such as “waiting for websites to open, failing to connect to the Internet, printers not printing, malfunctioning computers, and teachers having to work old computers” (Sicilia, 2006, p. 43) were included among the major barriers for teacher’s technical issues. “Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity” (Sicilia, 2006, p. 43). Korte and Husing (2007) argued that having ICT support or even maintenance contracts within the schools, help teachers to use technology in teaching without losing time through having to fix software and hardware problems. On one hand, we have the new movement for more technology integration in Ontario classrooms and on the other hand, there is no technical service in place for teachers that are actually incorporating technology in their lesson plans. Sicilia (2006) explains in her study that
“technicians were scarce and the students and teachers bore the consequences. There was only one technician for forty-five to fifty schools, and she did not have time to stay on top of the daily technical problems” (p. 44). Furthermore, elementary school teacher writes, “We didn’t really use it [a network communication and learning support system] last year because of all the upgrades and no support. For example, if you turn it on and it doesn’t work, I can’t figure it out and we won’t use it” (Means & Olson, 1995, p. 82). Not enough or improper training leads to teachers being neither sufficiently prepared nor confident enough to carry out full integration of ICT in the classroom (Balanskat et al., 2006).

2.6 Quality of research and Sources: Digital Citizenship

Digital citizenship is about teaching students about the “norms of appropriate and responsible technology use” (Ribble, 2016, p. 1). Are students equipped with the knowledge and skills to protect themselves? How can teachers and school administrators make sure students are using technology appropriately and in the proper manner? What is considered appropriate technology usage? With the focus of Bring Your Own Device (BYOD), introduced by Peel District School Board (PDSB) in 2012 and one-on-one initiatives in schools, there is a crucial need to talk about responsible technology use. Essentially, students need to understand what it means to be a Digital Citizen and this has been defined in the PDSB “as the norm of responsible behavior related to the appropriate use of technology” (PDSB Policy and Regulation, 2013, p. 1). Teacher blogger, May Hertz (2011) points out that “as elementary teachers, we are charged not just with teaching academics, but teaching social skills as well” (p. 1). For example, teachers would often teach younger student to “ignore bullies and tell an adult if you feel threatened,” Don’t talk to strangers,” and “Treat people the way you would want to be treated” (Hertz, 2011, p. 1). However, now since students are living in a digital era, it is necessary to teach them to be
safe online as well. Students are going to be using technology for various reasons in their class, hence they will need to understand how to safely and securely use it. For example, if a teacher assigns the class a research project, students will need to understand that a good citizen according to Ontario Software Acquisition Program Advisory Committee (OSAPAC), is one who “applies an inquiry model to gather, use and evaluate information in order to build knowledge” (OSAPAC, 2014). Furthermore, as a digital citizen, they will need to “use digital resources responsibly and adhere to user agreements” (OSAPAC, 2014). Similarly, there may be a time when the teacher gives them access to specific board resources and as such, they will need to understand that are to “protect the privacy of self and others” and “implement precautions for online security, such as passwords” (OSAPAC, 2014). Therefore, as a component to the effective integration of technology in schools, emphasis should be made to teach students on good digital citizenship. English and digital media teacher, Paul Barnwell (2014) mentions in a blog, with todays’ digitalization, Students are ever so close to the technology, as such, they must know the impact of their online activities (Barnwell, 2014). Often times, the younger the students are, the more likely they are to think that they are anonymous beings online (Barnwell, 2014). Employers judge their prospective students or employees from their social media profiles. Barnwell goes on to say that “by the end of class, many students were deleting inappropriate photos and tweets” (Barnwell, 2014). Hence, it is important to educate students on creating online personas that project positive and constructive image. Students need to be taught how to use “credible online resources such as databases, encyclopedias and ebooks” (OSAPAC, 2014). They need to be taught how to “evaluate and reflect critically on information, resources and sites” and “identify and respond appropriately to online issues such as cyberbullying” (OSAPAC, 2014).
Teacher blogger, Jean Montano (2013) writes that, the “quality of research and sources they find may not be top-notch” (p. 2). With the internet, students have access to boundless amount of resources at the tip of their fingers. However, students need guidance in identifying the difference between proper sources and unreliable sources. Students need to gain the ability to critically assess information, which means they need to have the ability to read and evaluate its level of accuracy, reliability and bias. “Only accurate, supported, and relevant information from credible sources should be followed up” (Mason et al., 2010, p. 608). Students are already cutting and pasting information they collect from the internet into school projects (Bunyi, 2010). Furthermore, teacher blogger, Bunyi, (2010) mentions that teachers may be “fostering a habit of not critiquing our sources for reliability and not crediting information”. Junior/intermediate students are usually concerned with content relevance more than credibility. “Primary sources are the place to teach students to slow down and read closely, to think deeply about the word choice and subtext” (Wineburg et al., 2012, p. 12). Elementary schools lack writing center that can help with this issue. In the end, this creates more work for the teacher. One of the goals of this paper is to provide strategies teachers may use to enhance learning through incorporation of technology into their classrooms.

2.7 Conclusion

In this literature review, I looked at research on the history of the role of technology within schools and how it has changed in modern times. Furthermore, I consider what is written in terms of technology integration and utilization in the curriculum and other published articles and compare this to what is actually happening in practice in classrooms. Thereafter, I looked at teachers’ perspective on technology usage and challenges that they are facing when implementing technology in their classrooms. Lastly, I consider the importance of promoting
digital citizenship as a component of the technology integration in Ontario schools. This review elucidates the extent that attention has been paid to the use of technology by teachers within classrooms. It also raises questions about individual teachers’ beliefs in regards to the use of technology and points to the need for further research in the areas of how teachers are being supported in their implementation of technology. In light of this, the purpose of my research is to learn about how teachers are integrating technology in classrooms thus far, so that we can improve their use of technology and make their integration of technology more effective in classrooms.
Chapter 3: Research Methodology

3.0 Introduction

This research study seeks to find the challenges elementary teachers in Toronto face with integrating technology into their classrooms and how they integrate it into their pedagogy. In this chapter, I described and explained the research methodology associated with my study and I discussed the reasons for why I chose to undertake such methodological approaches. I commenced by outlining my specific qualitative research approaches and thereafter my method of data collection. The participants of my research study as well as their backgrounds and relevance to my research purpose are also be acknowledged. Lastly, my research methodology was nuanced because I considered both the methodological limitations of the study but I also outlined its strengths.

3.1 Research Approach and Procedures

This research study was conducted using a qualitative research study approach, including an analysis of the literature through a literature review that examines terms such as “technology”, “traditional”, “contemporary” as they pertain to education. This qualitative study seeks to find how effectively digital technology (such as computers, laptops, tablets, smartboards and other tools) was incorporated into classrooms by teachers on a daily basis.

Levy (2015) quotes Heigham and Croker (2009) and mentions that “qualitative approach to research is used to focus on both the participants and their personal experience around the topic the researcher is interested in learning” (p. 2). Furthermore, Crouch and McKenzie (2006) illustrate that qualitative research allows for the interviewer to become closely linked with the interviewee which would allow for more in-depth inquiry and conversations in a more “naturalistic setting” (p. 483). As such, the style and approach of this qualitative study will be
narrative as I wish to capture and share the personal experiences of both teachers. In addition, I visited the schools during a convenient time for the teachers (e.g. before or after school) as so it will incorporate authenticity to the responses of the teachers because they can think and reflect on their experiences within the school boarders. Moreover, Anyan (2013) exclaims that “qualitative research interviews enable a more comprehensive understanding of what is behind all the data by providing an in-depth look at things like interviews” (p. 1). He goes on to argue that quantitative research methods are more bound by statistical significance and rely on numerical validity whereas qualitative researchers are more interested in going beyond the numbers and provide an in-depth insight about certain phenomena in a particular context (Anyan, 2013, p. 2). This is what my research study and purpose was grounded in that it will allow teachers to openly discuss their thoughts and experiences without saying that something needs to be correlated with numerical data.

3.2 Instruments of Data Collection

The primary method of data collection for this study was semi-structured interviews with those teachers that make the use of technology in the classroom. Pathak & Intratat (2012) suggest semi-structured interviews to be most beneficial for small scale research studies as it is not only flexible, but also allows the researcher to gather useful information through interviews that continue to be focused while promoting conversational communication between participants. Similarly, Gill et al., (2008) mentions that semi-structured interviews contain a list of open-ended questions about the topic or area being explored and allow both the interviewer and interviewee to go deeper and describe the topic in more detail (p. 291). Semi-structured qualitative interviews guide people on what to talk about but at the same time, they are flexible enough where people can add to the information as well (Gill et al., 2008, p. 291). As such, I
ensured that the interviews incorporated rapport building, critical thinking and thought-provoking interjections as a means to make the semi-structured interviews more effective.

For the purpose of this research study, the interviews were done on an individual basis because I did not want anyone perhaps influencing other people’s responses and it allowed for people to be comfortable sharing certain information that they would not be comfortable sharing in front of a group. “It is also the means of establishing a safe and comfortable environment for sharing the interviewee’s personal experiences and attitudes as they actually occurred” (DiCicco-Bloom & Crabtree, 2006, p. 316). This was important for this research as I wanted all participants to feel at ease when they disclosed their opinions and experiences and be reassured that the information they did share was solely for the purposes of the research and in no way, would they be identified or linked to what they said if they choose not to be.

I conducted face-to-face interviews with two teachers because speaking face-to-face, rather than over than phone or email, allows the researcher and participant to communicate not only verbally but also in a non-verbal way (Knox & Burkard, 2009, p. 568). As such, I was able to obtain indirect information from the participants’ body language, tone and facial expression as well as their words. All interviews were digitally recorded for accuracy. Each interviewee participated in a forty-five to sixty-minute questioning. In addition, I kept a log of my own notes throughout the course of the interview process which included observations of how the participants answered questions and their body language and tone.

### 3.3 Participants

Participants play a significant role in any type of study. Additionally, their contribution to a qualitative study shape it and create different interpretations within it. Robinson (2014) deems there is a “four-point approach to qualitative sampling: (1) defining a sample universe, (2)
deciding on a sample size, (3) devising a sample strategy, (4) sourcing the sample” (p. 26).
Accordingly, this section, gives details in correspondence to this approach, and I review the sampling criteria I established for participant recruitment. I also review a range of possible avenues for teacher recruitment. In addition, I have included a section wherein I have introduced each of the participants I have interviewed.

3.3.1 Sampling Criteria

The following criteria was applied to teacher participants.

1. Teacher was from a public elementary school (grades 4-8).
2. Teachers was currently working in the Toronto District School Board (TDSB).
3. Teachers had experience integrating technology within their classroom.

Qualitative research studies that involve semi-structured interviews is purposeful because you are being selective about who to include in your study but it seeks to maximize the depth and richness of the data that will relate and inform your research approach and questions (DiCicco-Bloom & Crabtree, 2006).

3.3.2 Recruitment Procedures

Many qualitative research studies that involve semi-structured interviews, similar to the one I conducted, benefit from a purposeful sampling technique as it involves being selective about the participants I include in the study while continuing to collect data that is both rich and in-depth in its insight around the topic of technology integration (DiCicco-Bloom & Crabtree, 2006). As my study is required to meet the parameters outlined by the Master of Teaching program at the University of Toronto, they have only permitted the interviews of two to three teachers. Hence, with such a small sample size, I cannot conduct a random sample as the participants I chose needed to represent my research topic and be able to share their experiences
with me. Therefore, a purposeful sampling ensures that the two participants were useful to my research topic.

It is important to note that the teachers selected for this research study were teachers I encountered on my practicums and who I had already developed a good rapport with, but that this was the only way to conduct a purposeful study that still fell within the parameters of interviewing two to three participants.

3.3.3 Participant Biographies

Hannah is a teacher working for the Toronto District School Board. She has six years of professional teaching experience and is currently the homeroom teacher for a grade 7/8 split class. She has taught middle school students and has been integrating technology into her lessons since the beginning of her career. She completed her bachelors of education at UOIT, where she enrolled in a technology intensive program.

Ameena is a teacher working for the Toronto District School Board. She has 10 years of professional teaching experience. She has taught mainly math at the elementary grade levels. She is currently the grade four math teacher. She attended York University for her teacher education and was enrolled in a technology course within the span of the program.

3.4 Data Collection and Analysis

The two interviews were recorded with consent from the participants. These recordings were then transcribed and I began the analysis by reading and re-reading the transcribed interview data. Key phrases and words were highlighted and noted along the margins. I then dove deeper into identifying the meaning of the data, as well as some of the implications hidden in it (Thorne 2000). After this stage, I compared and contrasted data around similar themes amongst participants and recorded them using a t-chart. By using this method, I was able to
easily distinguish intricacies of ideas that shared similar themes as they emerged. Dicicco-Bloom & Crabtree (2006) believe the method I have used in analyzing the data is more effective as the collection of data and its analysis was undertaken simultaneously and allowed me to constantly refer back to my research questions to conceptualize the data more effectively.

The next step of the analysis was to use and review the t-chart used to compare and contrast the ideas present in the interviews, to pinpoint the most prevalent and relevant themes that were common among participants. These themes were included in the final discussion of my results.

3.5 Ethical Review Procedures

As argued by Damianakis & Woodford (2012), “qualitative researchers must carefully balance two things: to acquire knowledge through comprehensive research and then maintain ethical and legal considerations as well” (p. 708). This study will follow ethical review standards provided by the Masters of Teaching Program at the Ontario Institute for Studies in Education. Before each of the interviews, research interviewee will be provided a letter of informed consent, which states the exact purpose of the study, the commitment they will need to make, exactly how their identity will be protected, and their rights as a participant to stop the interview at any time. The form also informed the participants that their interviews will be recorded for accuracy purposes and that the data they provided would be used strictly for this study. In addition, it gave the participants the right to receive a copy of the full written report of the study upon its conclusion, if they so choose. Letter of consent is provided in Appendix A.

I do not anticipate any ethical issues to arise as the information being asked of from the participants were not overly controversial, sensitive or intrusive. Hence, I do not believe it will negatively impact the lives of the participants. To ensure that my participants were comfortable
answering the questions asked, I allowed the participants to view the interview questions ahead of time. In addition, I still mentioned that they did have the right to refrain from answering any questions that they do not feel comfortable answering and re-stated their right to withdraw from participating in the study at any time. The names of the participants and their schools will remain confidential as pseudonyms were used when writing this paper. In addition, all recordings were deleted once transcribed with transcriptions safely stored on my personal computer. They were given the opportunity to review the transcripts, to clarify or retract any statements before I conducted the data analysis. By demonstrating my commitment to keeping them informed, my participants will be more willing to open up and be honest in answering the questions I ask (Gill et al. 2008). I had already ensured that I avoided questions that were leading or loaded but one point I was aware of during the interview, as mentioned by Gill et al (2008), was to remain neutral emotionally and make sure I did not interject signs of agreement or surprise to what the participants shared. “The strategic use of silence, if used appropriately, can also be highly effective at getting respondents to contemplate their responses, talk more, elaborate or clarify particular issues” (Gill et al., 2008, p. 292). Therefore, the steps taken throughout the interview process meet the guidelines of the ethical review committee and should prevent any issues from arising.

3.6 Methodological Limitations and Strengths

This research study was limited with regards to the sample size. While this research study aims to share the opinions of GTA teachers use of technology within the classroom—only two teachers participated in this study as I was unable to find teachers that met the participant criteria and whom were willing to conduct the interview. This sample size limited my ability to seek out patterns I saw in answers. I could not generalize my findings as it is only based on the
information three participants provided. Having said this, a small sample size can still provide interesting and important information about teaching English Language learners in the classroom, or about the TDSB schools themselves (Gibbs et al. 2007).

A strength of taking the qualitative research approach is that it provides a more in-depth look at understanding the topic at hand, which in this study is the teacher’s use of technology within the classroom and challenges encountered as a result of it. It is much more effective according to Gill et al. because it is less rigid than quantitative studies that rely on purely quantitative reasoning and outcomes through things like questionnaires (Gill, 2008, p. 292). Qualitative interviews provide an opportunity for teachers to vocalize their opinion and/or concerns and know that voice matters and is of value.

3.7 Conclusion

In this chapter I clearly articulated the research methodology and how my research will be conducted. I highlighted the research approach and procedure and supplanted that within a literature based context discussing the importance of qualitative research. I explained my main instrument of collecting data which are semi-structured face to face interviews and discussed how this type of interview is the most suitable to this study. Thereafter, I described the participants of this study and the corresponding criteria that will be applied to all interviewees. I also explained the recruitment procedures and how it was based on selective and convenience purposes to ensure that participants are somehow related to the topic. Next, I stated the data analysis and how I will examine and analyze the data output from the interviews looking for common attributes but also points where respondents differ in opinion as well. Ethical issues were also outlined such as anonymity, and participants needing to be informed before starting the interview. Finally, I stated the limitations and strengths of my research study such as sample size
and the lack of student voice and perspective but I also upheld the strengths of the study such as it being more in-depth and concrete, gives first hand experiences and it allows teachers to have a voice about their feelings and opinions on this topic. In the following chapter, I will elucidate the research findings and results.
Chapter 4: Research Findings

4.0 Introduction

This chapter provides insightful information derived from semi-structured interviews with two elementary educators who integrate technology in their classrooms. My research question is: *How can technology be more effectively integrated into elementary classrooms so as to enhance student learning?* The findings of this study provide significant knowledge regarding teacher’s perspectives, challenges and successes in integrating classroom technology.

After analyzing the interview transcripts in great detail, the findings were organized into four key themes and numerous subthemes that serve as responses to my main research question. The themes that will guide this discussion are as follows:

I. Teacher Training on Technology Use and Integration
   - Teacher Education
   - Professional Development
   - Curriculum Documents

II. Teacher Attitudes toward technology
   - Teacher’s Comfort with Technology Use
   - Learning Process

III. Challenges with Integrating Technology
   - Lack of Technical Support

IV. Importance of Digital Citizenship in Integrating Technology

4.1 Teacher Training on Technology Use and Integration

4.1.1 Teacher Education
For successful technology integration in schools, teacher education programs play a crucial role. “Teacher preparation on technologies should provide teachers with a solid understanding of the various media, their affordances and their constraints” (Vrasidas & McIsaac, 2001, p. 129). Both participants received some training on technology use and integration during their teaching program. However, the type of training greatly differed between the two teachers. Hannah talked about her years in teacher’s college at UOIT being completely technology intensive: “We had to get a laptop within the program. Every classroom that we were in had a smart board. And every time we learnt our subjects, like we learned about teaching English, geography, it was also using different types of technology”.

Hannah goes on to explain that the technology that was presented to her during teacher’s college were “relevant to education and it was not high tech”. For example, she mentions she was exposed to “Wikispaces and Audacity, and movie maker and other, different types of things that kids can actually use”. Furthermore, she has had positive experiences learning about how to integrate technology in her classroom. She describes the above by stating:

So, what our teacher’s college would use is, our professors would give out a project that they would actually give out to a student in grades 7 and 8 and then we had to find the different types of technology available to help create or make that project. We acted as grade 7 and 8 students. It was awesome!

Likewise, Ameena was introduced to technology relevant to education during her teacher’s college program at York University. However, it is important to point out that Ameena’s training on technology use during her teacher education greatly differed in terms of quality to that of Hannah’s. Ameena was specifically exposed to various forms of technology that can be used to communicate, whether it be with students, parents or the broader community. In addition,
Ameena was exposed to “traditional forms” of technology use within education. For example, Ameena was taught about various methods of delivering lessons through the use of technology as a means of making the delivery of lessons “more interactive”. Traditionally, the focus of the classroom was more on the teacher, where “learning is viewed as a consequence of receiving the information through good instruction” (Hooper & Rieber, 1995, p. 5). The role of technology was in how it supported the beliefs and practices of classroom teachers (Hooper & Rieber, 1995). In other words, from the traditional point of view, technology served as a tool for the delivery of instructional lessons, just like teachers. Traditional methods have been greatly criticized for “failing to emphasize practical problem solving and critical thinking” (Hannafin & Land, 1997, p. 167). Correspondingly, findings suggest Ameena felt technology was a great alternative to the chalkboard with regards to delivering lessons, however, the training she received during her teacher education program “was not sufficient to allow her to be confident and comfortable to using technology in her own classroom”.

The findings of this study with respect to teacher’s education on technology use and integration during are consistent with existing literature. That is “teachers have very positive attitudes towards the use of technology in education, but are far less confident about their ability to actually use the technology and do not think that their teacher training programs prepared them to use technology in innovative ways” (Mumtaz, 2000, p. 335). Furthermore, “teacher training faculties, although positive about IT, do not have a strong background in integrating that into teacher education courses they teach” (Mumtaz, 2000, p. 335). Therefore, teacher education program should be designed to provide new teacher candidates training on how to use specific and relevant education technology comfortably within the classroom so as to enhance student learning.
4.1.2 Professional Development

The participants in this study spoke passionately about their current positions within the education systems and about education as a whole. They both expressed concerns with regards to the amount of training they were receiving within the board on technology use and integration. Hannah believed that her opinions are a little biased when it came to the amount of training and education teachers should receive on how to integrate technology within the classroom because she went to UOIT for teacher’s college and “they were hugely technology intensive”. She describes her experience coming into the TDSB as the following:

I was a first year teacher, running basic technology overview during my lunch to staff. Like even as simple things as using Word and using PowerPoint and using Prezi. Umm and even search engines. And from what I gathered from teachers who go to teacher’s college is ummm…. technology is used as a presentation tool and not as a learning tool. But like I said, I was very lucky in UOIT to be given the opportunity to learn the different types of apps and websites and programs that are available.

The above quote suggest that teacher education programs greatly differ with regards to training teachers on how to effectively integrate technology, such that some programs like the one Hannah enrolled in, are very technology intensive while other programs are not. Hence, some teachers come out of their teacher education program very confident in integrating technology while others do not feel equipped to effectively integrating it. “The wide variation in teachers’ use of technology suggests there is an ongoing need for high quality professional development to help teachers, particularly those who are ‘digital natives’, use ICT to support learning where appropriate” (Chen et al., 2014, p. 10). Furthermore, the above quote suggest that teachers are greatly interested in learning to integrate technology within their classroom, however are not
provided adequate training to do so successfully. Hence, apart from teacher education programs that play a vital role in technology integration in schools, so does professional development. Educators, such as those described in this study, are not given the essential training needed to be equipped with successfully integrating technology within their classroom.

Ameena describes her experience in trying to integrate Google classroom in her own classroom by attending workshops provided afterschool by learning coaches at TDSB throughout the year. However, like Hannah, she expresses concern over the fact that it is left up to the personal and professional development of teachers to make sure they are up-to-date. She says, “The TDSB is not sending you out during the day and saying we are gonna pay you to be trained. It is in a teacher’s own personal time”. Hence, findings show that from the perspectives of these teachers, little is done by the board in terms of training teachers to effectively integrate technology. The initiative is left up to the teacher. This is consistent with existing literature which state that a significant aspect which many schools in Ontario seem to lack is professional development for teachers about how to use technology (Mumtaz, 2000; Jackson, 2013).

Therefore, professional development is very much needed for effective integration of technology in classrooms as a means to avoid technology being under-used or misused or avoidance of technology as a whole, as a result of inappropriate training and experience.

4.1.3 Curriculum Documents

Both participants feel that the curriculum documents need to be revised to better allow teachers to integrate technology into their classrooms. Hannah expresses her frustration with the layout of the curriculum documents by stating:

It is not just terrible because of technology; it is terrible in terms of what is laid out for students to be learning, how much they expect students to be learning and
how deeply they want them to learn these things. In my opinion, there is too much in the curriculum, and if we want kids to really have a deep understanding, then we need to slow down, we need to take out what’s not so important and put in what is important, what relates to real life, what are things we can do that show technology, but there is no technology in the curriculum, not at all.

Chen (2015) points out that the Government of Canada views the competency of using digital technology as one of the essential skills for the workplace (p. 4). However, because of Canada’s province-based jurisdiction, to date “there is no national policy on digital learning in place” (Chen, 2015, p. 4). As a result, policies and strategies of digital learning solely depend on individual provinces and territories. Likewise, both participants express a common opinion of putting the responsibility on Ontario and specifically the boards to include in the curriculum, resources teachers can use. Hannah specifically mentions that the board should include, “technology that we can be using and what different types of programs there are for us that are technology based that we can use in our classroom to help us teach these different types of expectations”.

Similarly, Ameena views that with the revision of the curriculum documents, we will see those changes with regards enabling teachers to effectively implement technology within their classroom: “We will see that the use of technology becomes a necessary expectation of the curriculum across strands and in different subject area”.

The existing literature (Kampylis et al., 2012; Borokhovski et al., 2011; Abrami et al., 2006) supports the findings of this study with respect to the educator’s perspective on the effectiveness of the curriculum document in clearly outlining technology integration. ICT-enabled curriculum allows for “flexibility, personalization and different learning styles to be
combined” (Kampylis et al., 2012, p. 7). In addition, learning can be “authentic, motivational and viewed as a social process” (Kampylis et al., 2012, p. 7). The inclusion of technology across the curriculum compels all teachers to “effectively plan for the integration of computers and information technologies into the teaching/learning process” (Martin, 2012, p. 269). Thus, Ontario, needs to revamp the curriculum to make it more teacher-friendly and provide resources within the curriculum on how to effectively integrate technology with specific curriculum expectations.

4.2 Teacher Attitudes toward Technology

4.2.1 Teacher’s Comfort with Technology Use

Interestingly, all participants were not exposed to the same quality of technology-related courses during their teacher education program. Yet, when asked questions regarding their attitude toward technology, the participants spoke positively about technology in both their daily and professional lives. Hannah talked about how she is extremely comfortable with using technology; it is something she enjoys using in her free time and while teaching. Furthermore, she feels it is a “wonderful thing to implement, especially at the intermediate, senior grades, technology is really important to use”. She goes on to describe the idea that since students are already exposed to technology in their personal lives, integrating technology within the classroom is effective with regards to providing students “with a culturally relevant pedagogy”. Both participants believe that students need to be equipped for the 21st century workforce and thus, integration of technology within the classroom is an essential to accomplish this. Ameena points out that “it needs to start in the school”. Teachers’ educational views, whether it be a constructivist belief or a traditional belief, act as an antecedent of computer use (Hermans et al.,
Teachers’ beliefs are significant in terms of explaining why some teachers may adopt computers in the classroom and other do not.

Hannah has encountered difficulties with technology; however, she has not experienced any negative situations to off put her from engaging with it. Since technology is considered a hobby for Hannah, much of her knowledge is derived from self-exploration. Furthermore, she has very positive views towards integrating technology in her classroom. As seen in the following quotation, Hannah believes it is important to make students familiar with technology since they will be using it on a regular basis as they get older. One way of achieving this is to make the use of technology something natural. She says:

My views on it are that if you’re not doing it, you’re not preparing students for the future. I think that it’s so widespread and all encompassing—the technology that will exist in their future. My goal in using technology as a teacher, is to make it second nature to the students so that they are not worried about how to use the tool.

Similar to Hannah, Ameena believes it is essential to equip students with “technical skills” as that is what is “needed to equip students for the 21st century world and jobs out there”. In addition, Ameena is comfortable using technology in her daily life and considers it to be somewhat of a hobby—she creates family videos and carries out her household finances electronically. The findings of this study with regards to teachers’ experience and comfort level towards technology go hand in hand with existing literatures. Teachers’ beliefs about the role of computers in education had a decisive impact on the success or failure of implementing technology (Windschitl & Sahl, 2002). Moreover, Yang and Huang (2008) research findings suggests that inexperienced teachers struggled more to implement technology than did
experienced teachers. They found the more computer literate teachers, to score higher in being more liable to cooperate with other teachers and being more capable of refocusing (Yang & Huang, 2008). That is, they were more adept at implementing and troubleshooting technology (Yang & Huang, 2008). Likewise, teachers who are already regular users of technology, have confidence in using technology within their classroom, perceive it to be useful for their personal work and for their teaching and plan to extend their use further in the future (Cox et al., 1999).

Although the use of technology in one’s personal life can influence use in one’s professional practice, the type and use of technology within the two contexts greatly differ. In most cases, the technology teachers use in their classroom is very different and more complex than any technology they would likely encounter outside of school. Thus, there are more confounding variables that influence the teacher’s comfort levels and attitudes toward technology. Mueller and colleagues (2008) concluded that positive experiences with classroom computers build a teacher’s attitudes and confidence. Nevertheless, the more positive an outlook you have on technology use, the more likely you are to be accepting of it and adopt it in your own life whether it is for personal or professional reasons (Thong & Yap, 1995).

### 4.2.2 Learning Process

Both participants feel that technology is affecting the student learning process in a positive manner. Hannah believes that technology is “providing students with the means of expressing themselves in ways that they never been able to express themselves before”. Additionally, she believes that technology is “opening up doors of opportunities for students in which they would have never known before”. Hannah feels that technology enables students to access information and learn about things all around the world, which they would be unable to do so without technology. She says: “I have Skyped students in other places in the world, like
other classrooms and getting that perspective is something—an invaluable experience that you could never give them any other time”.

Additionally, technology has enabled Hannah to differentiate her teaching, so to better meet the learning needs of her students. This can be viewed in the following quotation, where Hannah describes how she can differentiate using technology:

So, you know, especially these days we have students on IEPs, like I have six students on IEPs and even the way people are, like some people need to hear things, some people need to see things, some people need to do things, and some people need to touch things and technology really allows you to meet the needs of all the different types of learners, which is wonderful because if not, then we would be sitting at home trying to do it ourselves.

Similarly, Ameena feels it enhances learning as students have access to more resources they could use to help them reinforce concepts taught in class. She states:

So, if students have a question about something, then they can quickly access information. I think there is some really great ways that students can learn a concept that’s been taught in class for reinforcement. There are great math websites. Even going to YouTube and seeing how a concept is taught by somebody else, is really interesting as well. It is great to be able to access quick information, so I do permit devices in class. Ummm… and kids are encouraged to use them. If we are discussing something and we are not sure of something, then I say, let’s look it up.

The findings of this study with respect to technology integration being an effective means of enhancing student learning, is supported by existing literature (Cheung & Slavin, 2011;
There is substantial evidence that incorporating technology, of any kind, in the classroom as an instructional tool enhances student learning and educational outcomes (Gulek & Demirtas, 2005; Tamim et al., 2011). Hence, the question is not if technology should be incorporated, but rather, how can and should technology be implemented and used effectively by teachers in classrooms to better facilitate student learning. That is, technology can be used by teachers such as those in this study to enhance and differentiate learning for students.

4.3 Challenges with Integrating Technology

4.3.1 Lack of Technical Support

Although teachers may overcome their initial hesitation and anxiety of integrating technology, significant challenges still remain in terms of ensuring greater technical support. Both participants shared a common viewpoint with regards to technical support for teachers needing improvements. Pelgrum (2001) found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was “lack of technical assistance” (p. 173). Hannah describes her experience of going through numerous technical issues from having to use old refurbished laptops to poor Wi-Fi connections.

Our board is specifically pushing for the use of technology in the classroom, and research and inquiry and all of these things, and the Wi-Fi that they give us doesn’t even support having 30 students hooked up to Wi-Fi at the same time! You know it’s super slow. Or you know we are using refurbished laptops that take anywhere from 5 and 25 minutes to turn on.

This shows the frustration Hannah has in trying to integrate technology within her classroom and hence, may be a reason as to why some teachers may avoid technology as a whole. Many
teachers avoid trying to integrate technology within their lessons as it takes up valuable class
time working out the technology itself (Gorder, 2008; Chen et al., 2014). This can be understood in
the following quotation by Hannah:

I can totally understand why some teachers might be a little uncomfortable about using technology because to be honest, it is a complete pain in the ass. You are wasting a lot of valuable time that we could have been doing an activity that I can put together on a piece of paper or an activity that the kids are getting up and moving around and interacting with each other, but unfortunately that’s not always the case.

Similarly, Ameena has had a lot of technical issues like those described by Hannah. For example, Hannah described the year she had to work with old Dell computers which required almost 20 minutes for the computers to turn on and then another 20 minute for the website to open up.

Furthermore, Ameena describes her issues with not having enough resources for a classroom and thus, making her unable to use technology.

My issues are: we don’t have enough Chromebooks. We don’t have enough iPads. We have issues with charging. We have issues with keys missing from the Chromebook keyboards. We have issues with sharing the resources and logging in, interruptions with the Wi-Fi. Sometimes it is an absolute waste of time and frustration trying to use technology in the classroom. You tend to get a couple of teachers who think the stuff is theirs and – yah they are using it, it’s wonderful, but it becomes a hassle for me to borrow a shared resource.

The findings of this study are consistent with existing literatures (Sicilia, 2006; Korte & Husing, 2007). Technical problems such as “waiting for websites to open, failing to connect to
the Internet, printers not printing, malfunctioning computers, and teachers having to work old computers” (Sicilia, 2006, p. 43) were included among the major barriers for teacher’s technical issues. “Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity” (Sicilia, 2006, p. 43). As such, in order to ensure effective integration of technology in schools, barriers that impede teachers in using technology in their classrooms need to be taken care of efficiently. Having ICT support or even maintenance contracts within the schools, help teachers to use technology in teaching without losing time through having to fix software and hardware problems (Korte & Husing, 2007).

Although some schools are able to make do with the help of a knowledgeable teacher volunteer or part-time services, such arrangements are often unsatisfactory (Means & Olson, 1995). The findings from these teachers show that there is no onsite technical support for teachers. Ameena points out that “The tech guy are teachers around the school who have personal background experience and knowledge, but no we don’t have a technology person on site”. Hannah describes the fact that she is the technology person in her school. Furthermore, both participants felt that going through the board for assistance with technical issues is time consuming as a ticket needs to be sent out to the technology person at the head office of the board and a reply from them may take up to a week, depending on the emergency. Ameena’s frustration is evident by the following quotation:

Same thing with my desktops last year, umm… it was soo painfully slow. It worked in the morning but didn’t in the afternoon. So what was going on there, I didn’t know. I.T. came in and worked on it a bit. But once again a teacher is left to put in a ticket for I.T.—it is time consuming, it could be frustrating and if TDSB wants to incorporate more technology in the classroom then, they have to [put]
money where their mouth is and come in and see that we have challenges using it. And the board blocks us a lot, like we need to have administration passwords in order to download certain things/apps on the computer. And to get that permission you need to wait weeks.

Hence, although teachers are attempting to incorporate technology in their classrooms and require technical assistance on demand. Without good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT (Lewis, 2003; Sicilia, 2006).

4.4 Importance of Digital Citizenship in Integrating Technology

Digital citizenship is defined as an individual who is involved in society and politics through the consistent use of technology – essentially a cyberspace community (Ripple, Bailey & Ross, 2004; Shelley et al., 2004). Are students equipped with the knowledge and skills to protect themselves? How can teachers and school administrators make sure students are using technology appropriately and in the proper manner? What is considered appropriate technology usage? Both participants expressed a common viewpoint on the importance of teaching students about digital citizenship. Although both participants understand it is not an expectation of the board to teach about digital citizenship, each felt that it was part of their job to do so. Hannah mentions that it is vital to teach about digital citizenship through the following quotation:

So digital citizenship for me, I feel that before students use any type of technology in any type of way, they need to be taught how to use it effectively and how to use it in a way that is not breaking any rules. Plagiarism is a big thing. Students don’t understand that copying a song or a taking a picture off of google or writing out a sentence and not citing it, they think it’s okay…. So teaching students what a
credible website is, you know Wikipedia is not okay. Teaching them that skill and in my personal opinion, that could take years. Teaching your students how to properly use technology, how to properly cite their sources, I think it is something you can even teach grade ones… It is a simple step, that if we start young, it won’t be so overwhelming.

Although it is not a requirement of the board, Hannah takes the initiative to teach students how to properly cite sources. She says, “I have a massive book that I give out at the beginning of the year—how to cite MLA, APA that we do at the beginning of the year, once a week for six weeks, we do a 45-minute lesson on citing sources and how to do it properly”. Likewise, Ameena feels that teachers need to take into consideration that cautionary piece and make sure students understand the “consequences of putting things out on the web”. She mentions “…students need to represent themselves well and understand that they might mature but whatever they put out there, stays out there. Ummm, and there could be consequences to that”. Additionally, Ameena points that “although she is not a homeroom teacher, she still takes the initiative to set aside a class to touch upon the importance of digital citizenship”.

The findings from this study with regards to educating students on digital citizenship is consistent with existing literature (Ribble, 2016; Hertz, 2011; Barnwell, 2014). Since students are living in a digital era, it is necessary to teach them to be safe online. Students are going to be using technology for various reasons in their class, hence they will need to understand how to safely and securely use it. Students need to understand that as a digital citizen, they will need to “use digital resources responsibly and adhere to user agreements” (OSAPAC, 2014, p. 1). Thus, although the board does not require teachers to teach student
about digital citizenship, it is definitely a skill that will be of great benefit to students as described by the participants of this study.

4.5 Conclusion

This chapter presented the findings of a study focused on teachers’ perspective on technology integration within the classroom. The study gathered data using semi-structured interviews with two teachers from the Toronto District School Board and their perspectives and challenges with integrating technology were compared, contrasted and conceptualized through existing literature in the field. The interviews conducted with the participants, and the subsequent discussion with the literature consulted, was divided into four major themes that emerged throughout the study. These themes included teacher training on technology use and integration, teacher attitudes towards technology, challenges with integrating technology and the importance of digital citizenship when integrating technology.

Overall, the findings of this study showed that teachers have very positive attitudes towards the use of technology in education, but are far less confident about their ability to use the technology and do not think that their teacher training programs prepared them to use technology in innovative ways. Furthermore, teacher training faculties, although positive about technology integration, do not have a strong background in integrating that into teacher education courses they teach. Both participants expressed concerns with regards to the amount of training they were receiving within the board on technology use and integration. As such, both participants feel professional development is very much needed for effective integration of technology in classrooms. Moreover, the findings of this study revealed that technology is affecting the student learning process in a positive manner. Hannah believes technology is “providing students with
the means of expressing themselves in ways that they never been able to express themselves before”. Additionally, she believes that technology is “opening up doors of opportunities for students in which they would have never known before”. Meanwhile Ameena believes it is an excellent tool to differentiating for different learners. Both participants shared a common viewpoint with regards to technical support for teachers needing improvements. Lastly, although both participants understand it is not an expectation of the board to teach about digital citizenship, each felt that it was part of their job to do so.

In the following chapter, I discuss the implications of my research for the educational community, impact on existing literature, and share recommendations based on my findings related to technology integration in elementary classrooms.
Chapter 5: Implications

5.0 Introduction

This chapter will unite and discuss the implications of my research to school systems and practitioners. I commence this chapter by explaining how my findings relate to what was discovered in the existing research literature. Through this, I am able to connect teachers’ personal and practical experiences to the theory, as was described in chapter two. This connection allows me to elucidate the gaps in the literature and better understand how teachers are integrating technology in their classroom and the challenges they face in attempting to do so. I consider the implications of my research findings for the educational community and what the findings mean for me as an educator and researcher. Based on my conclusions, I recommend further research into how teachers are integrating technology to promote collaboration and creativity – the goals of 21st century learning. Some researchers suggest there is little exploration on exemplary use of technology in education (Berg et al., 1998); others claim that most research consists of case studies or new pedagogical tools (Mishra & Koehler, 2006). The current study investigated challenges associated with technology integration and areas in which improvement can be made. Additionally, my research informs administrators, school boards, and ministries of education that further research is needed to understand how educators can overcome the challenges associated with technology integration.

The purpose of this qualitative research study was to understand if elementary teachers are utilizing technology in a way that is conducive for student learning. The intention of my research was to better understand if elementary teachers are infusing classroom technology to promote the goals of 21st century education. The findings of this study have aided in closing the gap in existing literature between classroom technology and 21st century learning.
5.1 Overview of key findings and their significance

The findings of this study provide significant knowledge regarding teacher’s perspectives, challenges and successes, when integrating technology within the classroom. Furthermore, I was interested in how teacher education programs, professional development and the curriculum documents may be improved so teachers are able to effectively integrate technology within the classrooms. In this section, I discuss how the four themes and its sub-themes are significant in the context of existing literature. The themes brought forth that were consistent with the literature are as follows: (1) Teacher training on technology use and integration (2) teacher attitudes towards technology (3) challenges with integrating technology (4) the importance of digital citizenship when integrating technology.

For successful technology integration in schools, teacher education programs play a crucial role. “Teacher preparation on technologies should provide teachers with a solid understanding of the various media, their affordances and their constraints” (Vrasidas & McIsaac, 2001, p. 129). Findings from the study demonstrate that both participants received some training on technology use and integration during their teacher education programs. However, the quality of training greatly differed between the two teachers. Hannah was enrolled in a technology intensive program at UOIT and hence she was not in much need of professional development related to technology use and integration within the classroom. Meanwhile, Ameena received very surface level training during her teacher education program with regards to technology use in schools. Traditional methods of technology use have been greatly criticized for “failing to emphasize practical problem solving and critical thinking” (Hannafin & Land, 1997, p. 167). As a result, teachers like Ameena would require significant amount of training within the board as a means of effectively integrating technology within the classroom.
Furthermore, findings of the study reveal participants feel the curriculum documents need to be revised to better allow teachers to integrate technology into their classrooms. Chen (2015) points out that the Government of Canada views the competency of using digital technology as one of the essential skills for the workplace (p. 4). However, because of Canada’s province-based jurisdiction, to date “there is no national policy on digital learning in place” (Chen, 2015, p. 4). Thus, policies and strategies of digital learning solely depend on individual provinces and territories. The inclusion of technology across the curriculum compels all teachers to “effectively plan for the integration of computers and information technologies into the teaching/learning process” (Martin, 2012, p. 269).

Teachers’ educational beliefs are significant in terms of explaining why some teachers may adopt computers in the classroom and other do not. The findings from the study revealed that the participants feel that technology is affecting the student learning process in a positive manner. Hannah believes that technology is “providing students with the means of expressing themselves in ways that they never been able to express themselves before”. Simultaneously, Ameena views technology as a tool she can use to differentiate her teaching, to better meet the learning needs of her students. In addition, Ameena feels technology “enhances learning as students have access to more resources they could use to help them reinforce concepts taught in class”. The findings of this study with respect to technology integration being an effective means of enhancing student learning, is supported by existing literature (Cheung & Slavin, 2011; Cheung & Slavin, 2012; Fleisher, 2012). There is substantial evidence that incorporating technology, of any kind, in the classroom as an instructional tool enhances student learning and educational outcomes (Gulek & Demirtas, 2005; Tamim et al., 2011; Storz & Hoffman, 2013 Kozak & Elliot, 2014). In addition, findings suggest both participants have very positive outlook
on technology use and integration such that both participants expressed a high degree of comfort with technology use in their personal lives. Furthermore, scholarly articles have provided empirical evidence showing that a teacher’s confidence and beliefs influences their ability to utilize educational technology (Wang et al., 2004).

I wonder what the outcome would be for teachers who had negative experiences integrating technology into the classroom and the cause of these negative experiences to determine if technology would be utilized. Although the use of technology in one’s personal life can influence use in one’s professional practice, the type and use of technology within the two contexts greatly differ. Teachers who are already regular users of technology, have confidence in using technology within their classroom, perceive it to be useful for their personal work and for their teaching and plan to extend their use further in the future (Cox et al., 1999). Nevertheless, in most cases, the technology teachers use in their classroom is very different and more complex than any technology they would likely encounter outside of school. Hence, there are more confounding variables that influence the teacher’s comfort levels and attitudes toward technology.

As expected with technology, logistical problems were one area of concern. The findings from the study reveal that both participants share a common viewpoint with regards to technical support for teachers needing improvements. Both participants describe their frustration of going through numerous technical issues from having to use old refurbished laptops to poor Wi-Fi connections, when attempting to integrate technology within the classroom. The findings of this study are consistent with existing literatures (Sicilia, 2006; Korte & Husing, 2007). Technical problems such as “waiting for websites to open, failing to connect to the Internet, printers not printing, malfunctioning computers, and teachers having to work old computers” (Sicilia, 2006, p. 43) were included among the major barriers for teacher’s technical issues. Technical barriers
impeded the smooth delivery of the lesson or the natural flow of the classroom activity. Furthermore, Pelgrum (2001) found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was “lack of technical assistance” (p. 173). This results in many teachers avoid trying to integrate technology within their lessons as it takes up valuable class time working out the technology itself (Gorder, 2008; Chen et al., 2014).

The findings of this study revealed that the participants feel the importance of teaching students about digital citizenship. Although both participants understand it is not an expectation of the board to teach about digital citizenship, each felt that it was part of their job to do so. Hannah takes the initiative to teach students about what a credible website is and how to properly cite sources. The findings from this study with regards to educating students on digital citizenship is consistent with existing literature (Ribble, 2016; Hertz, 2011; Barnwell, 2014). Since students are living in a digital era, it is necessary to teach them to be safe online. Students are going to be using technology for various reasons in their class, hence they will need to understand how to safely and securely use it. Students need to understand that as a digital citizen, they will need to “use digital resources responsibly and adhere to user agreements” (OSAPAC, 2014, p. 1).

5.2 Implications

5.2.1 Broad: The Educational Community

This research study provides the educational community with a better understanding of how technology is integrated into elementary classrooms across Ontario. During the interviews, I discovered strategies for best practices as well as areas that need improvement when utilizing technology.

The Ontario Education Act requires schools to integrate and utilize technology to
enhance student learning, inform teacher instruction and develop technical skills that students can use later in life (Council of Ontario Directors of Education, 2011). Furthermore, several curriculum documents mention technology as an aid for teacher instruction, however, it does not appear to be infused into curriculum subjects (Council of Ontario Directors of Education, 2011). The issue with the Education Act is that there is no mention of effective use of technology; thus, in 2011 an advisory was developed to provide school boards with key components of 21st century learning and technology integration; these two infused would help with the effective use of technology to support student learning (Council of Ontario Directors of Education, 2011). Both participants described the lack in policies to ensure 21st century learning goals and technology are being infused in Ontario. The data collected from my participants can support this advisory and influence current regulations to ensure that effectiveness in using technology is a key component in education.

A main concern in this study is the lack of professional development and school support for integrating technology effectively. During their preservice education program, Hannah and Ameena received minimal training on the physical use of technology. Yet, the participants expressed a high degree of comfort with using technology in their professional and personal lives due to self-exploration. Through my study, I was able to discover that the educational community needs to move from the physical aspect of technology toward the cognitive implications it can offer on student development. Dawson & Rakes (2003) found that although principals receive technology training, they are not receiving the type that prepares them to promote the technology integration process at their schools. It appears that teachers who experience difficulty integrating technology effectively could be a result of minimal support offered by the school’s administration. According to Knapper (2001), the internet is good for
delivering professional development. All teaching and learning centers have websites which can be used to distribute information and provide instructional programs – a possibility for school administrators. My study provides insights for teacher education programs, school boards, and the Ontario Ministry of Education. It is evident that a root cause of ineffective use is due to a lack of professional development infusing technology with 21st century education. My study suggests that Ontario teacher education programs should offer courses on integrating technology effectively as well as for school boards to provide more professional development.

5.2.2 Narrow: Professional Identity and Practice

An essential goal for me as an educator is to foster 21st century learning skills. Research shows that if implemented correctly, technology can harness this potential. As a future educator conducting this study, I developed many insights regarding pedagogy and technology. The participants in this study spoke passionately about their current positions and about education as a whole. Nevertheless, they both expressed logistical issues when integrating technology into elementary classrooms. The common challenges were: broken technology, poorly developed batteries, weak Wi-Fi signal, a lack of devices and outlets, and student distraction. I consider these to be less concerning challenges as they can be easily rectified. Teachers need to adopt a modern learning approach, whereby they leverage the devices they possess to create opportunities for critical thinking, student voice, and flexible learning – there is no need to focus on the 1:1 ratio for technology. This discussion provided me with knowledge about technology problems that I would have not necessarily thought of on my own and it is consistent with existing literature. Earle (2002) found the following problems with technology integration into school systems: funding and access to hardware; skill development; administrative support; resistance due to traditional pedagogical practices; lack of training and
expertise. The logistical problems discussed by the participants should further inform school boards and administrators that these are systemic barriers to technology integration which can be prevented. Once these are removed, teachers may be more inclined to learn about technology and how it can be infused with 21st century learning. Personally, I believe these first-order barriers can be solved with less strain (Ertmer, 1999). As an educator, I am more concerned about the lack of professional development offered in Ontario. I believe it is more important to learn how to integrate technology with critical thinking – an essential life skill.

The position of a qualitative researcher has been a learning process for me. The interview procedure itself has allowed me to develop skills such as question formulation, communication, and active listening. Additionally, other aspects of the study have provided me with knowledge, I would not have otherwise acquired. Throughout the interviews and on-going analysis of the literature, I have developed an understanding of how technology is utilized in the classroom.

5.3 Recommendations

This study was limited to qualitative findings of two teacher interviews and thus recommendations for future research are limited and may not be reflective of all teacher populations. This study advocates for greater attention towards better equipping teachers with skills and resources to enable them to effectively integrating technology within the classroom.

Many studies to date have focused on teacher perspective of technology integration. However, there has been limited focus on the influence of preservice training, professional development and ICT-integrated curriculum has in enabling teachers to effectively integrate technology and hence enhance student learning. Therefore, suggestions for future research should take into consideration teacher training and ICT-integrated curriculum resources.
5.4 Areas for further research

Although the findings of this study are not generalizable as it is an in-depth analysis of two educators’ professional experiences, I believe there are valuable insights that can be helpful for current practitioners and researchers. The participants in this study are very committed to the educational field and shared many personal beliefs, successes and challenges for implementing classroom technology. Evidently, professional development is a key factor in effective integration of technology. Future research should examine the benefits of professional development in relation to educational technology integration and how educators go about receiving extra support.

Furthermore, this research study did not analyze the associations between the age of the educators and effective use of technology. Technology is evolving, so it would be important to interview teachers with varying years of experience. Future research should discover how novice teachers adapt to the use of educational technology compared with experienced teachers and to analyze the attitudes of each group. Do the years of experience provide teachers with strategies for integrating technology effectively?

5.5 Concluding Comments

My goal was to understand teachers’ perspectives, challenges and successes when integrating technology within the classroom. This qualitative study aimed to elucidate if elementary teachers are using technology in ways that are conducive for student learning. Rather than focusing on the types of technology utilized, this study examined how technology is integrated into the school systems. This research study revealed that teacher training program, professional development, and the curriculum documents need to be revised to ensure effective integration of technology within the classroom.
References


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Appendix A: Letter of Signed Consent

Date:

Dear _______________________________,

My Name is Farkhonda Sultanee and I am a student in the Master of Teaching program at the Ontario Institute for Studies in Education at the University of Toronto (OISE/UT). A component of this degree program involves conducting a small-scale qualitative research study. My research will focus on ways teachers can more effectively integrate technology within their classroom. I am interested in interviewing teachers who have attempted to integrate technology within their classroom. I think that your knowledge and experience will provide insights into this topic.

Your participation in this research will involve one 45-60 minute interview, which will be transcribed and audio-recorded. I would be grateful if you would allow me to interview you at a place and time convenient for you, outside of school time. The contents of this interview will be used for my research project, which will include a final paper, as well as informal presentations to my classmates. I may also present my research findings via conference presentations and/or through publication. You will be assigned a pseudonym to maintain your anonymity and I will not use your name or any other content that might identify you in my written work, oral presentations, or publications. This information will remain confidential. Any information that identifies your school or students will also be excluded. The interview data will be stored on my password-protected computer and the only person who will have access to the research data will be my course instructor. You are free to change your mind about your participation at any time, and to withdraw even after you have consented to participate. You may also choose to decline to answer any specific question during the interview. I will destroy the audio recording after the paper has been presented and/or published, which may take up to a maximum of five years after the data has been collected. There are no known risks to participation, and I will share a copy of the transcript with you shortly after the interview to ensure accuracy.

Please sign this consent form, if you agree to be interviewed. The second copy is for your records. I am very grateful for your participation.

Sincerely,

Farkhonda Sultanee
[Phone Number]

[Email Address]

Course Instructor’s Name: Dr. Rose Fine-Meyer

Contact Info: [Email Address]

Phone: [Phone Number]

Consent Form

I acknowledge that the topic of this interview has been explained to me and that any questions that I have asked have been answered to my satisfaction. I understand that I can withdraw from this research study at any time without penalty.

I have read the letter provided to me by __________ and agree to participate in an interview for the purposes described. I agree to have the interview audio-recorded.

Signature: __________________________________________________________

Name: (printed) ________________________________________________________

Date: ____________________________
Appendix B: Interview Protocol/Questions

Thank you for agreeing to participate in this research study, and for making time to be interviewed today. This research study aims to learn about how teachers are currently using technology within their classroom and the challenges they are encountering as a result of it for the purpose of my Master of Teaching Research Paper. This interview will last approximately 45-60 minutes, and I will ask you a series of questions focused on your own pedagogy, experiences, beliefs and opinions. I want to remind you that you may refrain from answering any question, and you have the right to withdraw your participation from the study at any time. As I explained in the consent letter, this interview will be audio-recorded. Do you have any questions before we begin?

Background Information

1. How long have you been teaching?

2. What grades do you teach?

3. What subject areas do you teach mostly?

4. Where and when did you receive your teaching credentials and qualifications? Did you receive any training on technology within education?

5. Can you explain the school’s context and/or community in terms of its demographics (diversity, socioeconomic status)?

Teacher Perspectives/Beliefs

6. What is your perspective in terms of implementation of technology and student learning? How is technology affecting the learning process?

7. In your opinion, how should technology be used within the classroom?

8. When can you expect technology to be effective?

9. What is your perspective with regards to the amount of training and education teachers receive on how to use technology within the classroom?

10. Do you feel the curriculum documents does a good job in outlining technology implementation within the classroom?
11. What is your opinion with regards to teaching students about digital citizenship? Do you feel you have a responsibility to teach students about digital citizenship?

Teacher Practices

12. What technologies do you use personally in your life?

13. Have you ever incorporated technology within your classroom? Why/why not?

14. How comfortable are you in using technology within the classroom?

15. In your classroom, what kind of technologies do you use on a daily basis? On a less regular basis?

16. Can you explain your reasoning behind using [this piece of technology]?

17. What resources do you use when using technology in the classroom? Any specific website?

18. Have you had any issues with technology in the classroom? Hardware issues? Software issues? Network issues?

19. If there was one thing you could improve with the technology you use in the classroom, what would it be?

Supports and Challenges

20. How does your school or school board assist you in obtaining resources that will help you teach and facilitate students using technology?

21. Is there some technology you would like to use in the classroom? What is currently holding you back from using it?

22. What is the biggest challenge you face when trying to integrate technology within the classroom? How do you respond to these challenges?

Next Steps

23. What advice or recommendations would you give for beginning teachers who are interested in using technology within the classroom?

24. Benefits and drawbacks to incorporating technology in classrooms?

Thank you for your participation in this research study.