IPAD IMPLEMENTATION IN THE MIDDLE SCHOOL CLASSROOM:

THE TEACHERS' PERSPECTIVES

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Abstract

This project explores the implementation of 15 iPads in a middle school by surveying and interviewing teachers to examine their Levels of Use, Stages of Concern, and the First- and Second-Order Barriers they encounter. The experiences of the teachers are examined in a framework that adopts the Concerns Based Adoption Model (CBAM), (Horsley, J.G. & Loucks-Horsley, S., 1998; Hedber, 2011) incorporating aspects of First- and Second-Order Barriers (Ertmer, 1999, Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., and Sendurur, P., 2012) and First- and Second-Order Barriers and Strategies (Hew & Brush, 2007). This modification reflects the importance of identifying barriers, and identifying strategies for overcoming them, as a new technology is integrated into a teaching practice. The research examines how the iPads were implemented at this middle school, the Levels of Use and Stages of Concern the teachers experienced, and the First- and Second-Order Barriers that were encountered in this iPad implementation. Possible next steps for this school are considered and best practices are suggested for schools considering the implementation of iPads into their programs. The intent of this study is to offer suggestions for improvement of iPad use at this middle school and to offer some 'best practices' for other schools that are considering implementing, or have decided to implement, iPads into their school's technology repertoire and to promote further research into iPad integration in elementary classrooms.

Keywords: iPad implementation, technology integration, teacher concerns, barriers

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I have enjoyed this learning experience, everything I have gained from it, and what I have been able to show to others. This paper is the beginning of a new path in my lifelong journey of learning. I look forward to the new challenges that await me and I am excited to see how the 21st Century learners change the world we live in today.

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Introduction

According to Marc Presenky (2010), "more and more young people are now deeply and permanently technologically enhanced, connected to their peers and the world in ways no generation has been before" (Prensky, 2010). He further comments that students unanimously do not want to be lectured to. They desire respect, trust and to have their opinions valued and counted. They want to connect and work with their peers, where they can make decisions and share control, while preventing slackers from getting a free ride. Students want to express and share their opinions and ideas both in the classroom and around the world. Most importantly they want to create using the tools of their time and to have an education that is not just relevant but also real (Prensky, 2010; Richardson & Mancabelli, 2011).

Teachers have an obligation and duty to meet the needs of their students but to date, there is still a strong disconnect between the world that students live in and the overall teaching practices that exist. This research project explores one aspect of the gap of the digital divide that exists between students and teachers today. This research project explores the implementation of iPads in a Middle School located in the Peel District School Board in Ontario, Canada. The study examines the integration of 15 iPads into a middle school environment. The iPads also come with a docking station, which safely stores and transports the iPads, and from which they can be charged. The iPads are available to teachers to use as they see fit. The principal of the school has invested in technology integration and has obtained additional funding from the board to support the school's technology initiatives. In this research project, the following questions are explored:

1. How did teachers' self-directed integration of iPads take place?

2. What types of barriers were encountered during integration? What were the teachers' attitudes toward barriers, and how did they change from pre-implementation to post-implementation?
3. What steps can be taken to improve the integration of iPads at this school and others? This research question is directed at developing a best practices guide for implementing iPads at the innovation level, as further described in this project's theoretical framework.

This mixed-methods study is conducted through a set of surveys that are completed using Survey Monkey (a free online survey site), supplemented by follow-up interviews, observations at staff meetings, and email updates received from teachers and administration. The participating teachers volunteered to complete the two surveys. Twenty-three teachers responded to the first survey, *Pre-Implementation of iPads in the Classroom* and twenty-six teachers responded to the second survey *Post-Implementation of iPads in the Classroom.* This survey data, together with interview data provided by two teachers, make up the two case studies that are included to give a more in-depth look at the barriers to implementation that were experienced.

Educational Context

I am completing this project in partial fulfillment of my M.Ed. program at the University of Ontario Institute of Technology. The school where this research is being completed is one of the pilot leading schools for the implementation of technology in the classroom. I also have a strong interest in technology and how it can enhance our lives. This school is also unique as it has specialized programs, such as the gender classes, and

has gained research attention. I am a grade 6, 7, and 8 teacher of general music at this school and this year I also taught grade 6 band.

Although I am a teacher who values integrating technology in teaching and learning, I did not incorporate the use of iPads in my own classroom, because I did not want to become biased or emotionally attached to the iPad or its use. As noted in Johnson & Burke (2004), "education researchers should eliminate their biases, remain emotionally detached and uninvolved with the objects of study, and test or empirically justify their stated hypothesis (Johnson & Onwuegbuzie, as cited in Johnson & Burke, 2004, p.14).

Definitions

The major definition in this paper that needs to be addressed is *technology integration.* In a review of the literature, there are many variations as to what this means. Hew and Brush (2007) present a simple definition for technology integration "as the use of computing devices such as desktop computers, laptops, handheld, computers, software, or Internet in K-12 schools for instructional purposes" (Hew & Brush, 2007, p.225).

The definition of *integration technology* that Lawless and Pellegrino (2007) use is taken from the *Technology in Schools Taskforce* (2003) report that is produced by the U.S. Department of Education, which states:

> Technology integration is the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure. Practices include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based

> transmission and retrieval of data, and other methods. This definition is not in itself sufficient to describe successful integration: it is important that integration be routine, seamless, and both efficient and effective in supporting school goals and purposes. (Lawless & Pellegrino, 2007, p.577)

This study focuses on the integration of iPads within both the classroom and whole-school contexts, and will therefore encompass both of the above-mentioned definitions. However, both definitions fall short of the requirements of "successful" integration discussed in the literature, specifically the need for a fundamental change in teaching and learning in order to successfully integrate new technologies. Therefore, I define *technology integration* as the use of computing devices such as computers, laptops, tablet computers, handheld devices, software, document cameras, projectors or Internet in k-12 schools for instructional purposes, and in the daily routines, work, and management of schools. For successful integration, it is important that integration be routine, seamless, and that it presents a fundamental shift in teaching practice that reflects the advantages of technology over teaching and learning from other methods.

Purpose

The purpose of this study is two-fold. Its first purpose is to add to the literature regarding technology implementation, which, although voluminous, does not address the implementation of iPads or tablet computers specifically. In many ways, the iPad offers new opportunities for teaching and learning that previous technologies have not offered: their touch screens make them ideal for tactile users and appealing for differentiation of instruction, they offer a wide range of affordable applications specifically designed for educational use that are easily downloaded and updated, offer advanced audio and video

recording and playback capabilities, are light and portable, have strong processing capabilities for a lower price than laptops, and because they are flat, remove a physical barrier between the teacher and student. These advantages create a real need for research that focuses on iPads, but because the iPad is a new technology, the existing research with respect to its use and implementation is very limited. I discuss these limits further in the Literature Review section of this study.

The other main purpose of this study is to provide recommendations and suggestions for "best practices," to both the middle school being studied, and to other schools looking to integrate iPads. Either the middle school being studied or other schools may use this research to improve the level of use of the iPads among teachers who have already integrated them into their teaching practices, and also to aid in implementing iPads for teachers who have not yet begun to do so. Because the data for this study was collected at a middle school in the Peel District School Board, its findings may be particularly useful for this board.

Literature Review

This literature review explores technology integration in the classroom, the use of iPads in the classroom, and Peel District School Board's Technology Initiatives. It ends with the development of a theoretical framework for this project, based on the Concerns Based Adoption Model (Horsley & Loucks-Horsley, 1998) with some modifications inspired by the work of Ertmer (1999) and Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur (2012) and Hew and Brush (2007) on barriers to technology integration, and strategies for overcoming those barriers.

Integrating Technology Generally

Over the last thirty years, "literally thousands of articles have been published recommending effective strategies to facilitate meaningful integration [of technology in classrooms]...with a large portion of these articles proposing strategies for eliminating or circumventing the barriers that impacted teachers' uses of technology in the classroom" (Ertmer et al., 2012, p.423; Ertmer, 1999). There is a concern expressed throughout the literature that schools are slow to integrate digital technologies or remain conservative in their ways of using technology, but many researchers encourage and recognize the need and successes that digital devices in the classroom can provide (Hill, 2011; Petko, 2012). Cuban (2001) has expressed this concern aptly, specifically addressing the need for a fundamental change in teaching practices to properly integrate technology into the classroom:

> ...I have concluded that computers in classroom have been oversold by promoters and policymakers and underused by teachers and students. I

> predict that the slow revolution in technology access, fuelled by popular support and continuing as long as there is economic prosperity, will eventually yield exactly what promoters have sought: every student, like every worker, will eventually have a personal computer. But no fundamental change in teaching practices will occur. (Cuban, 2001, p. 195-196)

This call for a need for fundamental change has been echoed in other work, and many definitions for successful integration of technology. While lower level use of technology in classrooms has increased, higher-level uses are still very much in the minority, which remains far removed from the best practices advocated in the literature (Ertmer, 2005). The goal of many researches appears to be to find a "disruptive pedagogy," where the relationship between new technology and ways of learning and teaching replace a previous technology or way of doing things (Hedberg, 2001, p. 1).

Barriers to technology integration. In 1999, Ertmer identified two types of barriers that impacted teachers' use of technology in the classroom, which were identified as First-Order and Second-Order Barriers. First-order Barriers were defined as those that were external to the teacher. They included resources (hardware and software), training, and support. The Second-Order Barriers were internal to the teacher and included factors such as teachers' confidence levels, beliefs about how students learned, and other perceived values of technology in the teaching and learning process (Ertmer, 1999). Many studies have explored the First-Order Barriers that Ertmer identifies and recent studies have shown that the gap in these barriers is improving, while the Second-Order Barriers are a greater challenge that needs to be addressed (Ertmer, Ottenbreit-Leftwich,

Sadik, Sendurur & Sendurur, 2012; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

Focus on teacher beliefs and attitudes. Many studies have addressed three levels of hierarchy that impact the integration of technology in the classroom: the individual (teacher) level, the school level, and the board level, though the individual (teacher) level has often been identified as the most important (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Petko, 2010). Ertmer's summary of the literature suggests that "it is impossible to overestimate the influence of teachers' beliefs" (Ertmer, 2005, p.36). Cuban has echoed this sentiment, stating "It's not a problem of resources, but a struggle over core values" (Cuban, 1997, cited in Ertmer, 2005, p.27).

Given their importance, teacher beliefs and attitudes are the most examined of the three levels, and have been described as the "final frontier" of integrating technology into the classroom (Petko, 2012; Ertmer, 2005; Ertmer, Oteenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012).

Ertmer (2005) postulates that addressing teachers' personal beliefs holds special challenges. Ertmer explains that "a change in pedagogy is a Second-Order change—change that confronts teachers' fundamental beliefs and, thus, requires new ways of both seeing and doing things" (Ertmer, 2005, p.26). Such changes are seen as irreversible, and therefore riskier and more difficult to achieve. There may also be challenges to staff developers, who have typically been concerned with facilitating first-order changes.

Strategies for overcoming barriers to technology integration. In 2007 Hew and Brush analyzed the literature that has been published from 1995-2006 with respect to barriers to technology integration. They categorize those barriers into six categories: (a)

resources, (b) institution, (c) subject culture, (d) attitudes and beliefs, (e) knowledge and skills, and (f) assessment. Four of the six barriers (a), (b), (c), and (f) could be categorized at First-Order Barriers and the remaining two (d) and (e) as Second-Order Barriers. Hew and Brush then provide the following strategies to overcome these barriers (a) having a shared vision and technology integration plan, (b) overcoming the scarcity of resources, (c) changing attitudes and beliefs, (d) conducting professional development and (e) reconsidering assessments.

In the conclusion of their study, Hew and Brush identify research gaps related to both barriers to technology integration and strategies for overcoming the barriers, and make further recommendations for research. This provides a helpful framework for discussing both the gaps and how recent studies have attempted to fill them.

Gaps in the research with respect to barriers. The first gap that Hew and Brush identify is the relationship between the first and Second-Order Barriers. They question "How much do we exactly know about how first and Second-Order Barriers interact and influence each other in hindering the integration of technology for instructional purposes?" (Hew & Brush, 2007, p.241). Many studies address specific barriers but may not focus enough on the interaction between the first and Second-Order Barriers identified by Ertmer (Ertmer, 1999). Hew and Brush highlight that the study by Ertmer et al. in 1999 (Ertmer, Addison, Lane, Rose & Woods, 1999) was unique in that it examined the relationship between First- and Second-Order Barriers instead of simply identifying them within the scope of the research. Many studies conclude that Second-Order Barriers pose a larger difficulty than First-Order Barriers when integrating technology in classrooms (Ertmer, Addison, Lane, Ross, & Woods, 1999; Ertmer, 1999) but as Hew

and Brush note, the danger of this assumption is that "educators and administrators may be led to assume that overcoming Second-Order Barriers is enough" (Hew & Brush, 2007, p.241). The other part of this gap is the need for a detailed analysis and to develop clear operational definitions of the barriers that have been identified.

Ertmer et al. (2012) suggest that First-Order Barriers have been addressed both in research and in practice. First-Order Barriers can be overcome when teachers have overcome Second-Order Barriers.

Ottenbreit-Leftwich, Glazewski, Newby and Ertmer (2010) identify that teachers' reasons for using technology in the classroom typically align with their value beliefs. Even where teachers find value in a particular technology use, they are unlikely to implement it if they cannot see how it would work in their classrooms. To implement technology into lessons, teachers must believe that they can make the lesson work given their abilities, limitations, and environment (Ottenbreit-Leftwich et al., 2010, p.1332).

Many teachers hold the same beliefs with respect to technology integration that they do to any change in the *status quo*, whether through school, board, or government mandates. Healy argues, "If the computer can accomplish the task better than other materials or experiences, we will use it. If it doesn't clearly do the job better, we will save the money and use methods that have already proven their worth" (Healy, 1998, p. 218).

Gaps in the research with respect to strategies. The second gap identified by Hew and Brush is the need for deeper analysis of the various strategies, including investigations of the strategies themselves, the potential drawbacks of each one, addressing the lack of historical context in general, and exploring the relationship among strategies to overcoming the barriers (Hew & Brush, 2007). Preliminary research

conducted by Zhao et al. in 2002, identified that the strategies were interrelated. Their study aimed to "better understand the conditions under which technology innovations can successfully take place in classrooms" (Zhao, Pugh, Sheldon & Byers 2002, p.484). They found that Second-Order strategies appeared to play a more significant role and Hew and Brush suggest that future research is needed to examine this claim (Hew & Brush 2007). A recent study showed that many of the teachers believed that technology integration was important, but did not know how to go about doing it. The article identifies many learning strategies for overcoming these obstacles: collaboration, formal instruction, exploratory learning, completing authentic tasks, follow-up support and feedback over extended period of time with mentors, ongoing reflective conversation with colleagues, and observations of other teachers practicing the skills. In any event, this approach seems appropriate, given that most participants in the study were already identified as at least being open to the use of technology (Banas, 2010).

iPads

Although there is a wealth of information published on technology integration, the same does not prove to be true for iPad integration specifically, mostly due to the relatively limited time that they have been available. Despite the lack of research, and the need for more research identified in nearly every study that has looked at iPads, the general consensus is positive about the use of iPads as a tool to promote differentiation, collaboration, and ownership of learning amongst students (Hill, 2011; Chen, 2011; Broda, Schmidt, & Wereley, 2011).

iPads and special needs. The benefits that iPads can provide to students with learning disabilities and special needs has been garnering particular attention amongst

scholars (Bellini & Akullian, 2007; Chen, 2011; Kagohara, 2011; Kagohara, Siafoos, Achmadi, O'Reilly, & Lancioni, 2012; McClanahan, Williams, Kennedy, & Tate, 2012; Price, 2011; Shah, 2011).

McClanahan et al. (2012) conducted a case study where a pre-service teacher used an iPad to improve the reading ability of a grade-five student with Attention Deficit Hyperactivity Disorder (ADHD) (McClanahan, Williams, Kennedy & Tate, 2012). The student recorded himself reading on the iPad, which was simultaneously video-recorded by the iPad. The student then watched the videos of himself reading. From watching the videos, the student recognized that he had been reading too fast, commenting: "sometimes when I read, I read too fast and it doesn't make sense" (p.24). For the first time, the student was thinking about his own learning. Over the course of the six-week case study, the pre-service teacher designed a program that used various apps to address reading concepts that this student continued to struggle with. For example, the teacher introduced the "INSERT" strategy to the student, which uses simple marks to identify areas of understanding, confusion, and importance in a text. After four lessons, the student independently applied the "INSERT" strategy to his learning, and suggested that using this method would help him with other subject areas. McClanahan et al. suggest that although their case study is limited because it was only conducted with one student, the gains this student made justify serious consideration and further research (McClanahan, Williams, Kennedy & Tate, 2012).

Kagohara et al. (2012) conducted a study using video modeling with iPads to teach students with Autism Spectrum Disorder (ASD) how to check spelling. They employed the iPad's spell-check, video recording, and video playback functions

(Kagohara, Sigafoos, Achmadi, O'Reilly, & Lancioni, 2012). The two participants performed less than 40% of the task-analyzed steps correctly during baseline, and correctly performed 76% and 100% of the steps respectively, after using the iPads with video modeling. Kagohara et al. suggest that the features of the iPad (and iPod touch) that allow video modeling are particularly useful in teaching students with ASD, and that this is consistent with other studies with respect to video modeling (Bellini & Akullian, 2007). Some advantages of this method, and iPad or iPod use, are: lower cost and time commitment, increased control over procedural integrity by employing pre-recorded instruction, constant accessibility to instruction because video can be permanently available, and portability of the lessons (if the device cannot be transported, the data often can be) (Bellini & Akullian, 2007; Kagohara, 2011; Kagohara, Sigafoos, Achmadi, O'Reilly, & Lancioni, 2012). As with the McClanahan (2012) study, this study was limited because only two students were involved. It also had a short follow-up period. The researchers questioned whether the positive results were achieved because the students in this study were excited to be using iPads (Kagohara, 2011; Kagohara, Sigafoos, Achmadi, O'Reilly, & Lancioni, 2012). This confounding factor also may have arisen in a recent study by Price (2011), where autistic middle school and high school students showed improved reading comprehension using iPads or interactive eBooks (Price, 2011).

The iPad's text-to-speech and speech-to-text capabilities also offer learning opportunities to students with communication disorders. These capabilities can give students a way to express themselves that they may not normally have (Chen, 2011; Kelley, 2012; Shah, 2011). Apps that have been developed for these functions include:

Proboquo2Go, MyTalkTools Mobile, Artikpix and iCommunicate. These studies also note the importance of portability and touch screen capabilities as being beneficial for special education students.

iPad Apps for special needs students have been written about and listed extensively; however, an in-depth literature review on this topic by Chen (2011) comments that there is little research on what the strengths and weakness of these apps are, how they can be practically integrated into daily instructional activities, and what the effects of these apps are on student learning. Chen provides descriptions of various apps, their advantages and disadvantages, and tips for incorporating the apps into daily teaching practices for special needs students (Chen, 2011).

iPad implementation. In 2011, three professors of education, Broda, Schmidt and Wereley (2011), conducted a roundtable session to explore the implementation of iPads both by pre-service teachers in their field placements, and also in their own practices when teaching pre-service teachers. The roundtable identified tablet computers, and the iPad specifically, as a natural choice to facilitate a paradigm shift in teaching and learning that would address the needs of today's digital native culture. They point out that with the iPad, "issues of cost, portability and complexity have parity in this tool and allow for flexibility to make sound theoretical and pedagogical decisions about when and where technology should be integrated" (Broda, Schmidt, & Wereley, 2011, p. 3151). They further suggest "that the widespread use of the iPad, based on a changing paradigm, the need for progressive teaching and learning, a growing need for instantaneous, robust communication, and an appreciation for how learning and teaching have changed will change the ways in which we teach and learn" (Broda, Schmidt, & Wereley, 2011, p.

3151). The roundtable session highlighted two categories of apps that could contribute to a paradigm shift in teaching practice: apps that improved teacher workflow, and apps that improved data sharing.

Improving Teacher Workflow. Their recommended apps for improving teacher workflow included: AirSketch, Mobile Air Mouse, and Jump Desktop (Broda, Schmidt, & Wereley, 2011). AirSketch turns tablets into handheld projected whiteboards, allowing group editing and annotating documents, and developing lists as a class. Mobile Air Mouse uses the iPad touch screen to control a projected desktop computer image, which allows teachers to move around the classroom and modify the display as they are teaching. Jump Desktop allows teachers to control any or all machines on a network, providing teachers with a way to project not only their own screen, but also students' screens, which opens up a world of possibilities within a teaching practice for sharing ideas and work.

Improving Data Sharing. With respect to data sharing, the roundtable recommended: 1) Pages or Documents-To-Go, 2) Notarize or Soundnote, or 3) Dropbox or other cloud-based storage systems.

Other Benefits. The roundtable's reflective analysis delves further into the benefits of the iPad, including silent typing, easy integration with other systems, elimination of the fold up laptop screen, which eliminates the barrier between the observer and teacher, affordable price point, and ease of sharing documents. They conclude that quick and easy access to efficient, user friendly, mobile technology is changing the nature of onsite field or clinical supervision experience (Broda, Schmidt, & Wereley, 2011, p. 3151).

iPad implementation with a class set. Conn (2012) conducted a study using a class set of iPads in an elementary classroom, found positive results, and highly recommended their use. The study found that it was beneficial to assign one iPad to each student and establish a Care and Use Agreement, to help foster a feeling of ownership, and to help the teacher keep track of the iPads and inspect them for misuse (Conn, 2012).

iPad implementation with less than a class set. Bennett (2012) has also written about iPad implementation by pre-service teachers, but at the elementary level, and with one to five devices per classroom. She argues that even with a limited number of devices, iPads can be integrated into classrooms in a fundamental way.

Bennett (2012) makes numerous recommendations based on the successful use and implementation of iPads by pre-service teachers she has taught. She suggests that teachers should "start with the idea that iPads are like personal electronic whiteboards. They can be used in place of whiteboards as projectors, either in the teacher's hands or to be passed around, or can mimic the interactive function of whiteboards, but on a one-to-one level" (p.23). The touch screens and ability to manipulate content are particularly helpful with kinaesthetic learners.

Apps can be thought of as instructional modules, which is particularly helpful for differentiated learning. Bennett recommends using apps that are not content specific, as many such apps focus on lower level thinking skills. Instead, a teacher can employ multiple apps (e.g. internet browser, eBooks, drawing apps, audio/visual apps) in the same lesson, to provide differentiated instruction on one device. Bennett's article lists many recommended Apps that address curriculum, Productivity and Creativity (see

Appendix 4). She also notes the advantage that Apps are licensed to one device, and update themselves, thereby reducing the strain on IT departments (Bennett, 2012).

Bennett (2012) notes that when using iPads, instructional design requires more innovative thinking, and lends itself to differentiated instruction. One option with limited numbers of devices is to set up learning centers with other interactive media. Another way was to use partners and trios, assigning certain roles within the partner or trio.

To address the common concern about inappropriate Internet use, Bennett recommends turning off Wi-Fi access to prevent inappropriate materials entering your classroom, or ensuring that the Internet is accessed through a secure school site.

It is important to note that substantial contributions to this discourse are being made online, often informally, through education & technology websites and blogs such as upsidelearning.com and Educational Technology Guy blog.

Students' perspectives. Students' perspectives are often left out of the research on the iPad, though they were addressed in a recent study by Barnes and Herring (2012).When given the choice of what technology would be integrated into their learning, 90% of students favoured Smartphones over other technologies. Tablets were not an option offered to them. Students across all economic backgrounds wanted to have a Smartphone so that they could constantly be connected. Instruction did not have to be offered on the Smartphone; the students' primary concern was being able to form social networks to assist with learning. In examining the social networks, Barnes and Herring found that they were used meaningfully. For example, Smartphones allowed students who needed assistance with homework to ask for help from their learning communities. The questions that students asked each other went beyond 'what did you get' and focused

more on 'how did you get your answer,' showing that their engagement levels in their own learning had deepened. This type of approach was enforced by teachers using the technology to assign homework questions in mathematics with the same structure, but using different numbers, thereby preventing students from sharing answers.

More generally, Barnes and Herring (2012) found that students are often unengaged in their learning programs because they cannot see the connection between what they were doing and the real world. Students wanted to have access to manipulatives and more multimedia in their coursework.

Of significant concern was that although recent research has shown that Smartphones have tremendous educational potential and can significantly improve learning, most schools have banned cell phones from classrooms because of the potential negative effects such as inappropriate content, cyber bullying, and students' inattention during class (Barnes & Herring, 2012).

Eichenlaub, Gabel, Jakubek, McCarthy, and Wang (2011) also studied student perspectives on iPad use, though their study was conducted at the undergraduate level, and with a specific view to the relationship of iPads and libraries. Nevertheless, their study sheds light on advantages and disadvantages of iPad use in education, and for time management and organization in the students' academic and personal lives. The four participating undergraduate students noted that the iPad offered "superior performance" when compared to a laptop, and noted the iPad's intuitive touchscreen interface, quick start up, lightweight design, and the 10-hour battery life as being particularly advantageous. They found particular apps, like 'Read It Later', helpful so that they could access webpages when they did not have Internet access. They also appreciated Dropbox,

which allowed them to use cloud-networking services to store their documents, and iStudiez, which helped the students with personalized course management and detailed timetables. Overall, the participants found that their academic workflow became essentially paperless and that the iPads improved their time management. The students noted concerns about the lack of a USB port, and having to rely on cloud computing. They also noted that although customizing the iPad was an advantage for personal use, it was a potential disadvantage when the iPads were expected to be shared (Eichenlaub et. al., 2011).

Criticisms of the iPad. Although the majority of articles on the iPad are positive, there are some pointed criticisms of the technology's use in the classroom. Before the iPad was launched, David Lankes (2010), director of the Information Institute of Syracuse NY, associate professor in Syracuse University's School of Information Studies, and director of the school's library science program, expressed skepticism that the iPads offered any real innovation: "when I looked at the iPad's original promo video, it was like watching a clip of someone reading a hardcover book and calling it digital" (p. 14). He complained that he wanted to see tablets allow users to annotate text, share documents, and share screens with other devices. All of these functions exist for the iPad, suggesting that Lankes' criticisms were primarily speculative; however, the fact that Lankes was not aware of the iPad's capabilities suggests a deeper criticism for educators: if educators do not know what an iPad can do, they cannot use them to their full potential (Lankes, 2010).

One notable barrier to effective iPad use is that the App store for the iPad can be difficult to navigate. There are too many apps available, the search capabilities are

limited and disorganized, and one often cannot get adequate information about an App without buying it (Price, 2011, Murray & Olcese, 2011).

In addition to the challenge of reviewing and searching for Apps, Murray and Olcese's study on Apps (2011) found that the available Apps were not tailored to the needs of the 21st Century learner, where knowledge is socially constructed and negotiated. Many apps were targeted at media consumption, and lacked a focus on creation or collaboration, both of which are so critical to developing 21st Century skills. The available Apps for teaching and learning also underused the hardware and software innovations offered by the iPad, including its multi-touch surfaces, efficient energy consumption and a 10-hour battery life, a rotating screen, a built-in accelerometer capable of recognizing motion and allowing the measurement of distance and speed, Bluetooth, Wi-Fi and 3G capabilities. Murray and Olcese (2011) found that although the iPad hardware and operating system capabilities could support teaching 21st century skills, the existing apps are built to support behaviourist or proto-cognitive methods of teaching and learning. Murray and Olcese (2011) suggests that to prepare our K-12 students with 21st century skills, more emphasis is needed on models of teaching that consider modern, collaborative, and constructive theories of how people learn (Murray & Olcese, 2011).

Another area of criticism of tablets concerns the difficulties of using a device that is designed for personal use for shared use. iPads are almost universally praised for the benefits they offer, but iPads and other tablets pose a serious challenge with syncing the devices to each other and with other devices. Getting the right material on the right device, or associated with the right account, can be a labour-intensive task, notably because eReaders and tablets are designed for an individual consumer with one account.

The large manufacturers, including Apple and Amazon, have not accommodated the needs of schools and libraries to implement these devices for shared use, especially with respect to the integration of each individual device or account's subscription services and eBook portals into one searchable library catalogue. Other challenges are that school-owned devices are often expected to stay at school, which limits students' ability to stay connected with each other and benefit from learning communities, and there are many issues with using different devices (Watters, 2012). This bodes poorly for bring-your-own-device initiatives, which the Peel District School Board has recently embraced.

Peel's Technology Initiatives

Examining the technology policies of the Peel District School Board ("PDSB") both provides context for the research in this study, and also provides an example of how board policies reflect and contradict the recommendations in the research for successful technology integration.

On March 27, 2012, the PDSB released its "Vision for Learning and Instructional Technology Plan" at their Regular Meeting of the Board. Its overall recommendation was to approve the transfer of $7 million from the Working Fund Reserve to cover the cost of IT infrastructure, i.e. to implement wireless Internet and a wireless network at all PDSB schools, upgrade capacity of the existing networks, and create cloud-base file storage for secondary students (Peel District School Board, 2012).

The Peel District School Board's "Vision for Learning and Instructional Technology Plan" states that it is rooted in the context of 21st century learning skills, asking the reader to "Imagine a new – ideal learning environment, it might be a place where:

- teachers and students are all learners
- the focus is more on questions, less on answers,
- understanding is more important than knowing
- we connect and learn with the world
- innovation and exploration are part of learning

…is based in the context of 21st century learning skills [including:]

- collaborative inquiry to solve real and relevant problems
- creativity and innovation
- critical thinking and problem solving
- communication

[and whereby] technology enables this kind of learning and engages students by:

- providing learning, anywhere, anytime
- supporting teacher innovation and capacity building
- enhancing equity of access through the use of personal devices and internet resources
- using social media to support inquiry and communication while building social responsibility and digital literacy
- strengthening connections with parents." (Peel District School Board, 2012)

The PDSB's Learning and Instructional Technology Plan further identifies that teacher support and professional training are among its key components. To support teachers, the Plan indicates that the PDSB has invested in Instructional Technology Resource Teachers ("ITRT's") to support classroom teachers through peer coaching. According to a July 10, 2012 email from the Peel District School Board to all teachers teaching at that board, there are approximately 10 ITRT's assigned to approximately 145 schools, and one IT specialist for the entire board. The PDSB's Policy does not mention any other efforts to assist teachers with integrating wireless internet into their teaching practices, and none of the $7,000,000 requested under the Plan was allocated to teacher training. There is no mention of how the Plan ensures that this investment will be used effectively, or in furtherance of the Plan's lofty goals. (Peel District School Board, 2012)

Other aspects of the Plan include:

1. The need for all schools to have equitable access to core technology, though there is no definition for what "core" technology is, there is no consistency among schools with respect to what technology is available, and new technology is obtained at the discretion of each school's administrators, and paid for through school budgets and through fundraising from vending machines.
2. That there must be a transition from the use of software to web-based applications. The Plan notes that many teachers have built their lessons around specific installed software titles.
3. That there should be a transition from data storage by the Board to cloud-based storage, increasing the need for Internet bandwidth in schools.
4. That because it cannot afford resources for every student, the PDSB will allow students to bring their own devices to school. No teacher training, plan, policy, or study is mentioned for what devices will be allowed, how to take advantage of the proliferation of a multitude of devices in schools, how to minimize the risks of that proliferation, or what impact this policy might have on the effectiveness of technology use in the classroom.
5. That Communication and Collaboration tools must be embraced. The plan identifies the need for multi-directional communication among all participants in the education system, and envisions the use of public and private social networks. The Plan does not devote any board-wide plan or resources to

establishing such networks, or describe any resources or policies designed to establish such networks (Peel District School Board, 2012).

There are two policy documents appended to the Plan, including one concerning appropriate use of technology, and the second concerning the physical safety of Wireless Internet Technology. The Appropriate Use Policy is directed at any individual authorized to access Board technology, including students, parents, employees, volunteers, visitors, contractors, or individuals employed by service providers. Superintendents, principals, and managers are responsible for ensuring that staff is aware of the Board policy, and instructing and modeling appropriate use of technology for staff and students. Teachers are responsible for supervising student use of technology and instructing and modeling appropriate use of technology for students. The policy is not written in student-friendly language and there is no student-friendly version available. It would not be comprehensible for most elementary or middle school students, and there are no translations for non-English-speaking parents or students.

Theoretical Framework

The theoretical framework that is used in this study is a modified version of the Concerns Based Adoption Model (CBAM) (Horsley, J.G. & Loucks-Horsley, S, 1998, Hedberg, 2011) that incorporates aspects of First- and Second-Order Barriers (Ertmer, 1999; Ertmer et al., 2012) and First- and Second-Order Barriers and Strategies (Hew & Brush, 2007) into the framework. This modification reflects the importance of identifying barriers, and identifying strategies for overcoming them, as a new technology integrates into a teaching practice.

CBAM describes three overlapping processes when technology is implemented: Stages of Concern, Levels of Use, and Innovation Components (see **Figure 1**). I will be considering the Stages of Concern aspect of CBAM when evaluating the responses from the Pre- and Post-Implementation of iPads surveys. I will use the Levels of Use aspect of CBAM to examine the level of use of iPads in their respective classrooms, both before and after implementation. Innovation Components are concrete tools, definitions, and standards for an innovative integration to take place. These components are often the results of the other two processes, and in this study, my recommendations regarding best practices will take the form of Innovation Components.

Concerns Based Adoption Model (CBAM) Framework:

STAGES OF CONCERN	
AWARENESS	
0 – Stage 0	-Describes a person who either isn't aware of the change being proposed or doesn't want to learn about it
SELF CONCERNS	
1 - Informal	-Refers to the questions we ask when we hear about something new
2 – Personal	-How it might affect us
TASK	
3 – Management	-Task concerns emerge as we engage with new skills, time demands, materials, etc.
IMPACT	
4 – Consequence	-Our thoughts on how we can make a program work better for learners (typically students)
5 - Collaboration	-How to make it work better by actively working on it with colleagues
6 – Refocusing	-Ultimately, being successful with the program and seeking out new and better change to implement

LEVELS OF USE

NON-USE	
0 – Non Use	-A person is taking no action with regard to the program or practice
I – Orientation	-A person seeks information about the program or practice
II – Preparation	-A decision has been made to adopt the new practice, and the person is actively preparing to implement it
USE	
III – Mechanical	-This reflects early attempts to use new strategies, techniques and materials. It is the point in our use of something new at which we often feel inadequate and awkward. At best, we feel as though we're preparing a new recipe for the first time, constantly referring to the cookbook for guidance and reassurance
IVa – Routine	-We have established a satisfactory pattern of behaviours.
IVb – Refinement	-People go beyond the routine by assessing the impact of their efforts and making changes to increase that impact
V – Integration	-People are actively coordinating with others to use the innovation
VI – Renewal	-People seek more effective alternatives to the established use of the innovation. (This is essentially the beginning of a new cycle on Stages of Concern and Levels of Use)

INNOVATION CONCEPTS

(6-8 CRITICAL CONCEPTS)

Figure 1: Concerns-Based Adoption Model (CBAM) Framework (Horsley, J.G. & Loucks-Horsley, S., 1998, Hedberg, 2011)

The work of Ertmer (1999) and Ertmer et al. (1999) and Hew and Brush (2007), summarized in **Figures 2 and 3,** are essential to understanding how new technology is implemented in a teaching practice. The movement (both forwards and backwards) among the Levels of Use and Stages of Concern often happens when teachers overcome barriers, or are confronted by new ones. By distinguishing First-Order Barriers from Second-Order Barriers, and the strategies for overcoming both types of barriers, we can better understand how teachers can move towards the highest levels of technology implementation. **Figure 4** below shows the modified CBAM framework as used in this

project. This framework acknowledges the areas of overlap among the Stages of Concern, Levels of Use, and Innovation Components. It situates First-Order Barriers between Levels of Use and Innovation Components, to reflect how First-Order Barriers affect the movement through the Levels of Use, and impact on what Innovation Components must be used to address them. It situates Second-Order Barriers in the middle of Levels of Use, Stages of Concern, and Innovation Components, to reflect how teacher attitudes and beliefs impact every aspect of technology integration. Finally, it situates the strategies for overcoming barriers as the catalyst that helps move through the Stages of Concern and Levels of Use towards an understanding of what Innovation Components are needed.

FIRST-ORDER BARRIERS	SECOND-ORDER BARRIERS
-Refer to those obstacles that are extrinsic to teachers (eg. Equipment, time, training, support)	-Refer to those obstacles that are intrinsic to teachers -Barriers that interfere with or impede fundamental change are referred to as Second-Order-Are typically rooted in teachers' underlying beliefs about teaching

Figure 2: First- and Second-Order Barriers (Ertmer, 1999), Ertmer et al. (2012)

FIRST- AND SECOND-ORDER BARRIERS AND STRATEGIES		
	BARRIER	STRATEGY
FIRST-ORDER		
	-Lack of resources -Institution	-Creating a shared vision and technology integration plan
	-Subject culture	-Obtaining the necessary resources
	-Assessment	-Having alternative modes of assessment
SECOND-ORDER		
	-Attitudes and Beliefs	-Facilitating attitude change
	-Knowledge and Skills	-Facilitating teacher knowledge and skills

Figure 3: First- and Second-Order Barriers and Strategies Hew & Brush (2007

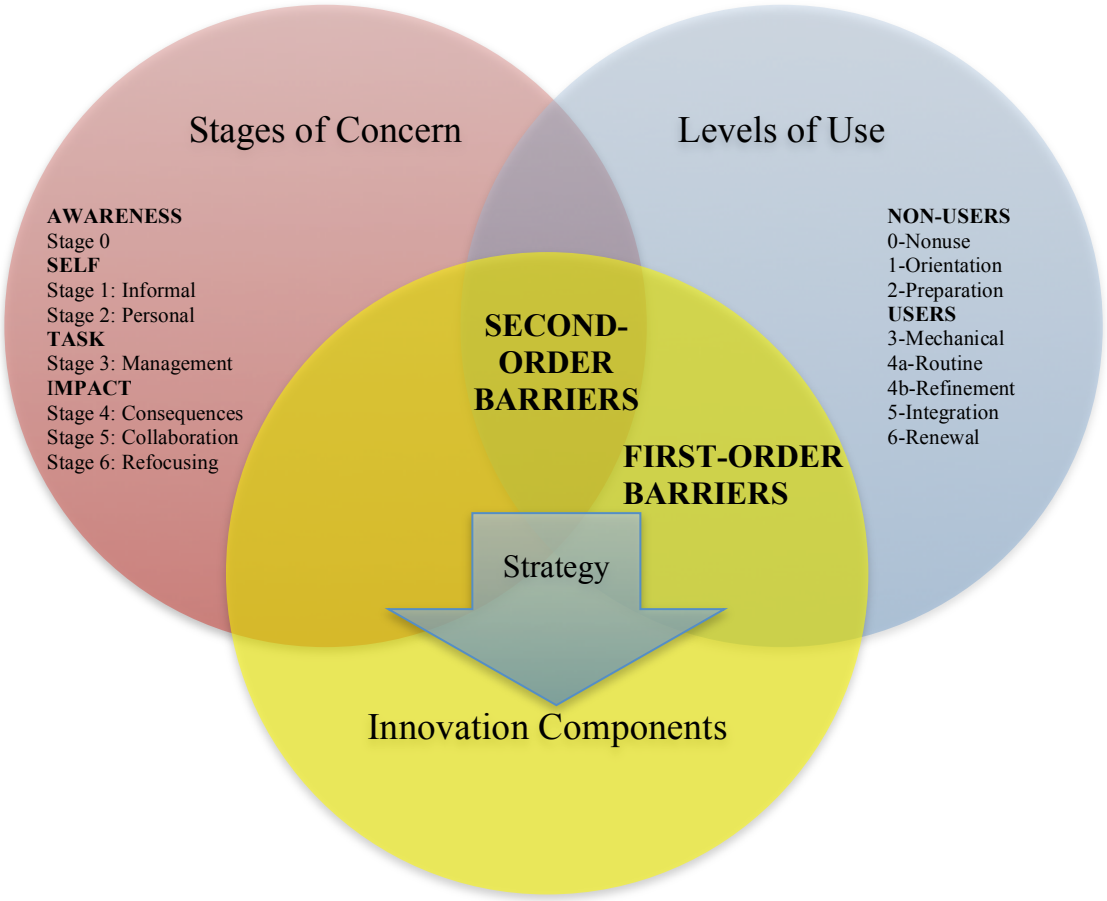

Figure 4: Wood's (2012) Theoretical Framework for iPad Implementation in a Middle School based on the Concerns-Based Adoption Model (CBAM) Framework (Horsley, J.G. & Loucks-Horsley, S., 1998, Hedberg, 2011) with adaptations from Ertmer et al. (1999) and Hew & Brush (2007)

Methodology

This project used a mixed methods approach consisting of both qualitative and quantitative data to attempt to answer the following research questions:

1. How did teachers' self-directed integration of iPads take place?
2. What barriers were encountered during integration and what impact did First-Order and Second-Order Barriers have? This question will focus on the change in teacher's attitudes during the study.
3. What steps can be taken to improve the implementation and use of iPads at this school, and what recommendations would be appropriate for other schools that either have begun their own implementation of iPads, or are contemplating doing so? This research question is directed at identifying Innovation Components that might help to achieve these goals, and developing recommendations that may be used in a best practices guide.

Research Context

The data for this study was collected during the 2011/2012 school year at a Middle School in Ontario, Canada. This middle school has been open for eight years and a new wing was added to the school at around the time of the 2008-2009 year because of higher than expected population growth. The school has approximately 775 students in grades 6 to 8, with approximately 10 classes per grade level. The school is situated in a new community with large, detached two story homes. It is located directly beside one of the feeder schools, and it is very close to a K-8 Catholic school. From the appearance of the community, it looks as though this would be a safe neighbourhood, however, it is well

known for its gang activity. There has been speculation amongst the school's staff and the Brampton community that this housing development was an unofficial project through which individuals were given a fresh start from the Jane and Finch area of Toronto, a neighbourhood known for violence and gang activity. This has not been confirmed through official channels.

This school is unique for many reasons. One is that it is a "technology school" that receives additional board funding for pilot projects involving technology for student use. This school has a computer lab with up-to-date computers, where students can work on a 1-to-1 student to computer ratio, with full Internet access. There are black-and-white and colour printers available for staff and student use. There is an additional half-class set of desktop computers available in the library, and a half-set of netbooks. The school began the 2011-2012 year with one cart of 20 netbook computers for general use, and gained another cart during the year with an additional 20 computers. The netbooks can be signed out and taken to any classroom to use. Each classroom has at least one computer, if not multiple computers, and is equipped with a projector and speakers. Most classrooms also have a document camera, or have access to a shared document camera between one teacher and their respective teaching partner. Another unique feature of this school is the grade 7 and 8 Technology Classes. These classes are designed to have technology integrated into lessons, units, and activities, though all teachers are encouraged to integrate technology where possible.

Another exceptional feature of this middle school is the single-gender classes. After grade 6, students and parents have the option of enrolling students in a single-gender class. Homeroom teachers, or administration, are also able to recommend to parents that

their child may be more successful in a single-gender classroom. To date, this program has had high enrolment, and most years there is one gender class for each gender at each grade level (7 and 8). The all-boys gender classes have one dedicated netbook cart (a third cart at the school), which includes a class set of netbooks and an Internet hub. Typically, the homeroom teacher and teaching partner assigned to the grade 7 single gender classes will teach the same students the following year, to ensure continuity as the students progress. Other researchers have studied the all-boys gender classes and their use of technology at this school, but to preserve anonymity, this will not be addressed further in this paper.

The student body is mostly comprised of students from immigrant families, predominantly from India, Jamaica, and Africa. There are also significant minorities of Asian and Caucasian students, and the latter group of students, or their parents, are generally from Eastern European countries. Many of the students have working-class or low-income parents with both language barriers and multiple jobs, which, combined with the gang activity in the neighbourhood, results in generally low-parental involvement at the school.

The teaching population at this middle school is diverse compared to other schools in the Peel District School Board. Although the majority of teachers are Caucasian females, which is typical of teachers across Ontario, there is also a high number of male teachers, as well as teachers and administrators from many different cultural backgrounds, including Indian, Jamaican, and African. The teachers at this school generally enjoy using technology in their classrooms and teaching practices. The school hosts a monthly Internet café, where teachers and students from other schools in

the area can come and share ideas and learn from one another about the use of technology in teaching and learning.

Research Paradigm

I have chosen a mixed methods approach as defined by the *SAGE Encyclopaedia of Qualitative Research Methods,* and as used in the call for manuscripts for the *Journal of Mixed Methods Research*, as "research in which the inquirer or investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of study" (Creswell, 2008). Supporters of Mixed Methods research note that a more complete understanding of what is being researched can be gained from a mixed methods approach, compared to using a qualitative or quantitative approach alone (Johnson & Onwuegbuzie, 2004). In Mixed Methods research, the two strands of data (quantitative and qualitative) must be mixed, combined or linked by integrating them, which can be done by connecting them at the various data analysis steps. Creswell (2008) identifies three methods of connecting qualitative and quantitative data, which are:

1. by combining or integrating them,
2. by connecting them from the data analysis step of the first source of data to the data collection step of the second source of data so that one source builds on the other or helps to explain the other, or
3. by embedding one secondary or supporting source of data into a larger source of data to provide additional information in a study.

For this project, I use the first approach: qualitative and quantitative data are mixed by combining and integrating them at the data analysis and interpretation stages. For the

purposes of this study, and to get a more in-depth look at the challenges facing teachers who implement iPads in their classrooms, I use a case study approach (Stake, 1995) and draw upon the experiences and responses of two teachers in particular.

Data Gathering

The data used in this project was obtained through two surveys, two interviews with open-ended questions, as well as through direct observations. The project was introduced at a staff meeting that took place before the iPads arrived at the school. At this point, teachers were invited to participate in the research study, and were given a consent form and letter explaining the scope of the study, requesting their participation, and setting out levels of participation that the teachers could choose from. The teachers were asked to fill out the consent form before they left the meeting, though many completed the form later. After the teachers submitted their consent forms, the teachers who wished to participate in the study were sent the survey "Pre-Implementation of iPads in the Classroom" (please see Appendix 1 for survey questions), and were asked to complete the survey in a timely manner.

When filling out the first survey "Pre-Implementation of iPads in the Classroom," teachers were directed to two different sets of questions, depending on whether they planned to use iPads or not. If the teacher did not plan to use iPads in their classroom, they were directed to questions designed to gain an understanding of why they were not going to use iPads, and what it would take to use them. If the teacher did plan on using the iPads, then the questions were designed to elicit how they planned to use the iPads, their apprehensions, their expected results (in the classroom and with respect to their own

beliefs, attitudes, and pedagogy), their preparedness to use the iPads, and what support they would have wanted from administration before the iPads arrived.

At the beginning of June, the second survey, "Post-Implementation of iPads in the Classroom," was sent to the teachers who participated in the first survey (see Appendix 2 for survey questions). Teachers were directed to answer a series of questions based on how the iPads were used in the classroom, if they were used at all. The questions were designed to gain an understanding of how they were used, what the benefits and disadvantages were, what difficulties and limitations the teachers encountered, and what their experiences, and those of their students, were like. Another focus of this survey was how the teachers' pedagogical beliefs changed, what supports they had, (including training and support from administration), and how their assessment practices changed. Finally, the teachers were asked for their opinions with respect to suggestions for improving iPad implementation and use. The questions posed to teachers who did not use the iPads aimed to understand the reasons they were not used, whether the teachers planned to use them in the future, and what they knew of their students' experiences with iPads outside of that teachers' classroom.

Any teachers who were willing to be interviewed were invited to do so at the end of the school year. The interview questions were designed to be open ended so that teachers would be able to share what they felt was relevant in their experiences with the iPads in their own classrooms. The interviews were able to provide a way for teachers to reflect on and express their experiences with the iPads in a deeper, more meaningful way than the surveys leant themselves to. The questions that were asked at the interviews are

provided in Appendix 3 and survey transcripts for these teachers are found in Appendix 7.

Another data source that was used in this study was the information gleaned through observing staff meetings and general discussions about technology and iPad implementation, and through email exchanges dealing with the use of iPads in the school.

Although the engagement letter for this study indicated that I would be available before, during, and after the implementation to troubleshoot questions and complications that arose during the implementation of the iPads, and its subsequent use, no teachers accepted the offer.

Using surveys as the primary source of data for this project was advantageous because the very busy staff members were able to complete the surveys online at their leisure. Most completed the surveys at home in the evening hours. There was also minimal buy-in for the teachers in completing this study, and they were quick and easy to complete. This project also used online surveys because of the limited time and funding available for this research.

The survey questions in both surveys were designed to be as open ended as possible to allow for the teachers to share as much information as they felt comfortable sharing. The questions were broad so that the scope of the answers was not limited, and did not suggest a particular answer.

Data Analysis

A content analysis was completed for each set of survey answers and interviews. To complete this content analysis, both sets of survey answers (pre- and post-implementation) were coded. The coding was designed to be a straightforward method

for quantifying the survey data, and was based on pre-existing numerical scales (e.g. Levels of Use, from 0 to 6). The coding in this study was not the first step of a grounded theory as developed by Strauss and Corbin (Strauss & Corbin, 1990). All survey answers were included in the coding, whether partially completed or incomplete.

The analysis of the data from both surveys and interview questions required multiple layers of coding and interpretation. During the initial coding, the surveys were coded to identify and highlight the First-Order and Second-Order Barriers, and where the teachers resided on the Stages of Concern and Levels of Use scales. Further coding was done to show what specific First- and Second-Order Barriers teachers faced and/or overcame. The responses were then quantified to show the percentages of each area overall, and with respect to individual questions.

The following chart outlines which questions of each survey were coded to address the various parts of the theoretical framework for this project. The remaining questions in the survey explained how iPads were used, suggested ways that they could be used, and provided a qualitative source of data to triangulate the quantitative findings, thereby strengthening the validity of the project findings.

Questions to be coded in order to address:	Pre-Implementation of iPads in the Classroom Survey	Post-Implementation of iPads in the Classroom Survey
First-Order and Second-Order Barriers	4, 5, 8, 15, 17	3,4, 12 (First-Order only), 17, 20, 21 (First-Order only), 22
Stages of Concern	4, 5, 6, 7, 8, 10	11, 13, 17, 20
Levels of Use	4, 5, 7, 16	2, 13, 17

Table 1: Questions Coded for First and Second-Order Barriers, Stages of Concern, Levels of Use

In addition, two interviews were conducted with willing participant teachers from the school. The data from these interviews is presented in two case studies in order to

give a more in-depth picture of the challenges faced by the teachers in implementing the iPads.

One overarching goal of analyzing the data was to examine the changes within the Stages of Concern and Levels of Use, the types of and specific First- and Second-Order Barriers, from pre-implementation to post-implementation. This helped to establish the next steps needed for this school, and to develop recommendations for other schools.

Limitations and Biases

There are limitations of this study that can be addressed in future research. Although all but three teachers participated in both surveys, the overall sample size was small. This research was only carried out at one school, whereas a larger-scale study in diverse settings might have provided a more detailed analysis of iPad implementation and teachers' attitudes.

This study was completed in a relatively short time period because the iPads were only available from the end of February until the end of the school year in June. The school only received 15 iPads in total, which made it difficult for all willing teachers to have a chance to sign out the cart to use them. Another factor that could limit the use of the iPads was that they had to be signed out for half of a day at a time. For rotary teachers, this meant that they would have to have the iPads for six whole days in order to have two 46-minute blocks of time with the iPads to use with a particular class.

This middle school was one of the first schools in the Peel District School Board to purchase iPads, so it was virtually impossible to compare this school's experience with other schools in the same board. At the time of writing, there were no other published studies available that examine the implementation of iPads into any middle school.

Another limitation was that the mere fact that the participants were being asked questions about their planned iPad use invited them to reflect on these questions. The questions were open-ended and often broadly-worded, so they did not likely suggest a "correct" answer; however, the process of reflecting on certain questions may have helped frame the teachers' beliefs and attitudes, and this may have impacted the results of the study. Despite this limitation, even if the framework of the questions did influence the teachers, it was to the end of improving the teachers' preparation for introducing iPads to their students. Creating a framework for teachers to help them think about iPad implementation, whether through training or other means, would be a minimum recommendation by this project regardless of the survey results.

Project Findings

This section summarizes the findings from the *Pre-Implementation of iPads in the Classroom* and *Post-Implementation of iPads in the Classroom* surveys, and the two case studies that were based on teacher interviews. The data from the two surveys were coded according to the First- and Second-Order Barriers, Stages of Concern, and Levels of Use that were identified in the teachers' responses. These were also the organizing principles of the theoretical framework for this study, which, as previously noted, was developed by combining the Concerns-Based Adoption Model (CBAM) Framework (Horsley & Loucks-Horsley, 1998 and Hedberg, 2011) with adaptations relating to First- and Second-Order Barriers from Ertmer (1999), Ertmer et al. (2012) and strategies for overcoming barriers studied by Hew & Brush (2007). A discussion of the case studies follows the presentation of the survey data, to reflect and reinforce the themes that emerged. I then present other emerging themes found in the surveys that do not directly fit into the theoretical framework, but which provide context for the quantified results. These themes point to the next steps for this school and a 'best practices' guide.

Barriers

In this section, I present the findings relating to First- and Second-Order Barriers. First-Order Barriers refer to those obstacles that are extrinsic to teachers. Examples include equipment, time, training, and support. Second-Order Barriers refer to those obstacles that are intrinsic to teachers. They are typically rooted in teachers' underlying beliefs about teaching and about themselves, and can be more challenging than First-Order Barriers when it comes to making a fundamental change in teaching practices.

Some of the Barriers that teachers identified were ambiguous as to whether they were First-Order or Second-Order, and some of the challenges associated with the interrelatedness of First- and Second-Order Barriers are addressed in the Literature Review and Discussion sections of this project. Barriers that raised issues that were generally outside the teachers' control, such as the iPads' ability to save data, were categorized as First-Order Barriers. Barriers that raised issues that were within the teachers' control, or that depended on the teachers' own attitudes, such as their own lack of confidence, were categorized as Second-Order Barriers.

Pre-Implementation of iPads in the Classroom Survey. Questions 4, 5, 8, 15, and 17 were coded to identify the First- and Second-Order Barriers therein (see **APPENDIX 1: Pre-Implementation of iPads in the Classroom**).

Questions 4 and 5 were only answered by the two teachers who did not plan to use iPads in the classroom. In Question 4, "Why do you plan on not using iPads in your classroom?" their answers referred to barriers five times. Although there were four different answers given, the First-Order Barriers all related to a lack of training, and the Second-Order Barriers all related to the teachers' hesitance to change the educational programming they had been using.

Question 4: Why do you plan on not using iPads in your classroom? 2 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
not sure how to use	1	50.0%	20.0%
lack of resources on using in educational context	1	50.0%	20.0%
First-Order Barriers Total	**2**	**100.0%**	
did not want to change educational programming	1	33.3%	20.0%
not sure how to use in program	2	66.7%	40.0%
Second-Order barriers Total	**3**	**100.0%**	
Total	**5**		**100.0%**

Table 2: Question 4 Pre-Implementation of iPads in the Classroom Survey

When asked what it would take to use the iPads, one of the two teachers who did not plan to use the iPads wanted "more time with students." The other teacher wanted his or her lack of knowledge with respect to iPad use to be addressed.

Question 5: What would it take to have you use iPads in your classroom? (i.e. what type of training, administration support, etc.) 2 Respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
More time with students	1	100.0%	50.0%
First-Order Barriers Total	**1**	**100.0%**	
Lack of Knowledge on iPad use	1	100.0%	50.0%
Second-Order barriers Total	**1**	**100.0%**	
Total	**2**		**100.0%**

Table 3: Question 5 Pre-Implementation of iPads in the Classroom Survey

Twenty teachers responded to Question 8, which asked about the teachers' apprehensions about using iPads. The responses identified 29 barriers: 13 First-Order Barriers and 16 Second-Order Barriers. The most common First-Order Barrier that teachers were concerned with was a perceived lack of resources (46.2%), including not having one iPad per student, slow or inconsistent Internet connections, and issues with downloading software. The most common anticipated barrier was student misuse of the devices, whether the students were on-task or off-task. Though potentially a First-Order Barrier, this was classified as a Second-Order Barrier because it reflects the teachers' apprehensions and fears about student misuse, and

their attitudes and beliefs about the students, the devices, and their own abilities to manage their classroom. **Question 8:** What apprehensions do you have about using iPads in your classroom? 20 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Issues with saving/deleting data	5	38.5%	17.2%
Apps	1	7.7%	3.4%
Lack of Resources	6	46.2%	20.7%
Lack of Training	1	7.7%	3.4%
First Order Barriers Total	**13**	**100.0%**	**44.8%**
Unsure of what they are apprehensive about	1	6.3%	3.4%
Organization of class time	3	18.8%	10.3%
Appropriate student use concerns	8	50.0%	27.6%
Lack of confidence and knowledge	4	25.0%	13.8%
Second-Order barriers Total	**16**	**100.0%**	**55.2%**
Total	**29**		**100.0%**

Table 4: Question 8 Pre-Implementation of iPads in the Classroom Survey

Nineteen respondents answered Question 15, which was about activities teachers would like to do with iPads but felt they could not. They identified 24 barriers. The teachers identified a lack of resources, including a lack of Apps or e-books, as the most common barriers. Teachers' concerns about their own lack of knowledge or skill were also common. This barrier was categorized as a Second-Order Barrier because the responses reflected the teachers' apprehensions and lack of confidence about using the devices in an educational context, as opposed to being categorized as a First-Order Barrier, such as "lack of training."

Question 15:What activities would you like to do with the iPad that you feel at this point you are not able to do and what is preventing you from doing these activities? 19 Respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of Time	1	6.6%	4.1%

Lack of Resources	7	46.7%	29.2%
Lack of Apps or e-books	7	46.7%	29.2%
First-Order Barriers Total	**15**	**100.0%**	**62.5%**
Lack of Knowledge or Skill	5	55.6%	20.8%
Attitude	3	33.3%	12.5%
Fundamental Change	1	11.1%	4.2%
Second-Order barriers Total	**9**	**100.0%**	**37.5%**
Total	**24**		**100.0%**

Table 5: Question 15 Pre-Implementation of iPads in the Classroom Survey

Question 17 was intended to be open-ended to allow teachers to share any other thoughts they had on iPad use in their classrooms. The most common barrier that was raised, by over one third of teachers who expressed concerns, was their lack of training on the iPads.

Question 17: Is there anything else that you would like to share with me with respect to using iPads in your classroom? 21 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of Training	4	66.7%	36.4%
Lack of Resources	1	16.7%	9.1%
Lack of Apps	1	16.7%	9.1%
First Order Barriers Total	**6**	**100.0%**	**54.5%**
Lack of Knowledge	2	40.0%	18.2%
Attitude	3	60.0%	27.3%
Second-Order barriers Total	**5**	**100.0%**	**45.5%**
Total	**11**		**100.0%**

Table 6: Question 17 Pre-Implementation of iPads in the Classroom Survey

Tables 7 and 8 below summarize what Barriers were anticipated by the teachers across the entire *Pre-Implementation Survey*, and how they were distributed between First-Order and Second-Order. Overall, the respondents identified a slightly higher percentage of First-Order Barriers (52.11%) than Second-Order Barriers (47.89%), though the distribution was relatively even between the two types of barriers. "Lack of resources" was the most commonly anticipated barrier (19.72% of all barriers), and lack of apps and e-books, which was a more specific instance of a resource that was

anticipated to be lacking, added another 12.68%. Added together, almost one third, or 32.40% of all barriers were related to the teachers' anticipated lack of resources. Among Second-Order barriers, the teachers' lack of confidence in their knowledge or skills was the most common (16.90%). Concerns about students' misuse were also prevalent (11.27%).

Question	Number of Respondents	Number of Barriers	Number of First-Order Barriers	Number of Second-Order Barriers	Percentage of First Order Barriers	Percentage of Second Order Barriers
4	2	5	2	3	40.0%	60.0%
5	2	2	1	1	50.0%	50.0%
8	20	29	13	16	44.8%	55.2%
15	19	24	15	9	62.5%	37.5%
17	21	11	6	5	54.5%	45.5%
Total		71	37	34	52.1% (avg.)	47.9% (avg.)

Table 7: Pre-Implementation of iPads in the Classroom: First and Second-Order Barriers

Overall Barriers for Pre-Implementation of iPads					
Barrier	**# of times identified**	**Question #**	**% of type of barrier**	**% of total barriers**	**Comments**
FIRST-ORDER					
Unfamiliar with use of device	1	4	2.70%	1.41%	**52.11% of all barriers in the pre-implementation survey were First-order barriers**
Lack of resources on using in educational context	1	4	2.70%	1.41%	
More time needed with students	1	5	2.70%	1.41%	
Issues with saving/deleting data	5	8	13.51%	7.04%	
Lack of Resources (not enough iPads for each student, slow/inconsistent Internet, issues downloading software)	14	8, 15, 17	37.84%	19.72%	
Lack of training	5	8, 17	13.51%	7.04%	
Lack of time	1	15	2.70%	1.41%	
Lack of Apps or e-books	9	8, 15, 17	24.32%	12.68%	
Subtotal	**37**		**100.00%**	**52.11%**	
SECOND-ORDER					
Did not want to change educational programming	1	4	2.94%	1.41%	**47.89% of all barriers in the pre-implementation survey were second-order barriers**
Not sure how to use in program	2	4	5.88%	2.82%	
Unsure of what they are apprehensive about	1	8	2.94%	1.41%	
Organization of class time	3	8	8.82%	4.23%	
Appropriate student use concerns	8	8	23.53%	11.27%	
Lack of confidence, knowledge, or skill	12	5, 8, 15, 17	35.29%	16.90%	
Attitude	6	15, 17	17.65%	8.45%	
Fundamental change	1	15	2.94%	1.41%	
Subtotal	**34**		**100.0%**	**47.89%**	

Table 8: Overall Barriers for Pre-Implementation of iPads in the Classroom Survey

Post-Implementation of iPads in the Classroom Survey. In contrast to the *Pre-Implementation Survey*, which asks about the teachers' anticipated use of the iPads, the *Post-Implementation Survey* asks about the teachers' actual experiences. Questions 3, 4, 12, 17, 20, 21, and 22 from the *Post-Implementation of iPads in the Classroom Survey*

were relevant to First- and Second-Order Barriers. Questions 12 and 21 were only coded for First-Order Barriers, as they did not ask about Second-Order Barriers. Questions 20, 21, and 22 were only asked of participants who did not use iPads in their classroom. Excluding the First-Order only questions, the distribution between First- and Second-Order Barriers that the teachers experienced was very similar to the distribution of anticipated barriers in the *Pre-Implementation Survey*. In the *Pre-Implementation Survey*, 52.11% of anticipated barriers were First-Order Barriers and 47.89% were Second-Order Barriers. In the Post-Implementation Survey, 55.93% of experienced barriers mentioned, excluding the questions that were First-Order Barriers only, were First-Order, and 44.07% were Second-Order.

Question	Number of Respondents	Number of Barriers	Number of First-Order Barriers	Number of Second-Order Barriers	Percentage of First-Order Barriers	Percentage of Second-Order Barriers
3	18	17	11	6	64.7%	35.3%
4	18	19	11	8	57.9%	42.1%
12	16	16	16	n/a	100%	n/a
17	16	7	3	4	42.9%	57.1%
20	6	11	6	5	54.6%	45.4%
21	6	5	5	n/a	100%	n/a
22	6	5	2	3	40.0%	60.0%
Total (all questions)		80	54	26	67.5%	32.5%
Adjusted Total (without First-Order only questions)		59	33	26	55.9%	44.1%

Table 9: Post-Implementation of iPads in the Classroom: First- & Second-Order Barriers

When asked about disadvantages (and advantages) of using iPads in the classroom, the respondents primarily addressed three different concerns: Lack of resources (23.5%), difficulties with saving/deleting information (29.4%), and concerns about inappropriate student use (29.4%). These three barriers were also commonly identified in the Pre-Implementation Survey, though overall, lack of resources was identified as the most common anticipated barrier**.**

Question 3: What benefits and disadvantages have you seen since using iPads in your classroom (or other classrooms)? 18 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of resources	4	36.4%	23.5%
Difficulties saving/deleting information	5	45.5%	29.4%
Lack of apps	1	9.1%	5.9%
Assessment concerns	1	9.1%	5.9%
First Order Barriers Total	**11**	**100.0%**	**64.7%**
Appropriate student use concerns	5	83.3%	29.4%
Teacher Attitude	1	16.7%	5.9%
Second-Order barriers Total	**6**	**100.0%**	**35.3%**
Total	**17**		**100.0%**

Table 10: Question 3 Post-Implementation of iPads in the Classroom Survey

Eighteen respondents answered Question 4, which asked about difficulties and limitations that the respondents encountered. This question elicited the most diversity in responses, and raised some unique First-Order Barriers that addressed the specifics of the iPads, and using the iPads given the Peel Board's resources. These barriers included "control restrictions by PDSB", "software glitches caused by Apple products in a PC world", and the incompatibility of the Flash plug-in with iPads.

Question 4: What has worked well and what difficulties have you encountered? Have you encountered any limitations and if so, what are they? 18 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of Apps	2	18.2%	10.5%
Lack of Resources	4	36.4%	21.1%
Difficulties saving/deleting work	2	18.2%	10.5%
Control Restrictions by PDSB	1	9.1%	5.3%
Apple Products in PC World software glitches	1	9.1%	5.3%
Lack of Flash on iPads	1	9.1%	5.3%
First-Order Barriers Total	**11**	**100.0%**	**57.9%**
Student Distraction	5	62.5%	26.3%
Knowledge/Skill	2	25.0%	10.5%
Attitude	1	12.5%	5.3%
Second-Order Barriers Total	**8**	**100.0%**	**42.1%**
Total	**19**		**100.0%**

Table 11: Question 4 Post-Implementation Survey of iPads in the Classroom Survey

Question 12 asked teachers to identify what the school administrators could have done to support them with iPad implementation, and what suggestions they would have to administrators at this and other schools. This question only examined First-Order Barriers, as it only asks about barriers that are extrinsic to the teacher. 16 barriers were identified by the respondents. Although the respondents identified six different categories of barriers, lack of training was the most common, having resonated with 43.8% of the respondents. Having a guide or booklet for general iPad use, being provided with specific lesson ideas, and seeing how other teachers have used iPads were also identified, and all of those suggestions could be seen as more specific suggestions relating to a lack of training. If these additional categories were considered under a broader umbrella of "lack of training", than 13 of the 16 barriers, or 81.25%, signified that the respondents wanted to see more training provided by administrators.

Question 12: What steps do you feel the administration at school did to help prepare you to use iPads in the classroom and based on your experience, what suggestions would you make to other administrators wanting to implement iPads in their classrooms? 16 respondents - First-Order Barriers Only			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of Training	7	43.8%	43.7%
Want a booklet/guide to follow	2	12.5%	12.5%
Lack of Resources	2	12.5%	12.5%
Would like to know how others used	1	6.3%	6.3%
Specific Lesson Ideas	3	18.8%	18.7%
Lack of Protective Cases	1	6.3%	6.3%
First-Order Barriers Total	**16**	**100.0%**	**100.0%**
N/A	0	0.0%	0.0%
Second-Order Barriers Total	**0**	**N/A**	**N/A**
Total	**16**		**100.0%**

Table 12: Question 12 from Post-Implementation of iPads in the Classroom

Question 17 asked the teachers about their plans to use the iPads in the future. The responses were mostly positive, and of the 16 teachers who responded, there were only seven barriers that were identified. These fell into the more common categories that have been identified throughout both surveys.

Question 17: After this year's experience with using the iPads in the classroom, what do you hope to do with the iPads in the future and what may you stay away from? (Will you use them again? How?) 16 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of resources	2	66.7%	28.6%
Assessment	1	33.3%	14.3%
First-Order Barriers Total	**3**	**100.0%**	**42.9%**
Knowledge	3	75.0%	42.9%
Attitude	1	25.0%	14.3%
Second-Order Barriers Total	**4**	**100.0%**	**57.1%**
Total	**7**		**100.0%**

Table 13: Question 17 Post-Implementation of iPads in the Classroom Survey

Questions 20, 21, and 22 were asked of teachers who did not use the iPads. Six respondents answered each question. The barriers among these three questions were consistent with both the anticipated barriers identified in the *Pre-Implementation Survey*, and also with the experiences of the teachers who did use the iPads. The one issue that was raised by teachers who did not use the iPads, and it was raised by one third of the teachers who did not use the iPads, was the recommendation that administration ensure that all teachers have equal time to us the iPads in their classrooms.

Question 20: Why did you decide not to use iPads in the classroom? Please list all reasons. 6 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Lack of Time	2	33.3%	18.2%
Lack Resources	2	33.3%	18.2%
Lack Training	2	33.3%	18.2%
First-Order Barriers Total	**6**	**100.0%**	**54.6%**
Attitude	1	20.0%	9.1%
Knowledge	3	60.0%	27.2%
Fundamental change in belief	1	20.0%	9.1%
Second-Order barriers Total	**5**	**100.0%**	**45.4%**
Total	**11**		**100.0%**

Table 14: Question 20 Post-Implementation of iPads in the Classroom Survey

Question 21: Is there anything that administration could have done that would have enabled you to use iPads in your classroom? 6 respondents – First-Order Barriers Only			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Equality of use	2	40.0%	40.0%
Lack of Training	2	40.0%	40.0%
Lack of Resources	1	20.0%	20.0%
First-Order Barriers Total	**5**	**100.0%**	**100.0%**
n/a	0		
Second-Order barriers Total	**0**	**0.0%**	
Total	**5**		**100.0%**

Table 15: Question 21 Post-Implementation of iPads in the Classroom Survey

Question 22: What advantages and/or disadvantages have you noticed with other classrooms using the iPads? 6 respondents			
Barrier	**# of times identified**	**% of type of barrier**	**% of total barriers**
Concerns about saving/deleting info	1	50.0%	20.0%
Assessment concerns	1	50.0%	20.0%
First-Order Barriers Total	**2**	**100.0%**	**40.0%**
Concerns about appropriate student use	2	66.7%	40.0%
Knowledge	1	33.3%	20.0%
Second-Order Barriers Total	**3**	**100.0%**	**60.0%**
Total	**5**		**100.0%**

Table 16: Question 22 Post-Implementation of iPads in the Classroom Survey

Table 17 below provides an overall summary of the barriers identified in the *Post-Implementation of iPads Survey*. The summary includes barriers that were mentioned in the *Pre-Implementation Survey* but were not identified in the *Post-Implementation Survey*, though the number of times identified has been marked as "0." As mentioned above, the distribution of barriers between First-Order and Second-Order was very similar between the *Pre-Implementation Survey* and the *Post-Implementation Survey* after being adjusted for Questions 12 and 21. Lack of resources was again the most common barrier referred to by teachers, only dropping from 19.72% in the *Pre-Implementation Survey* to 18.75% in the *Post-Implementation Survey*, though the percentage of references to a lack of apps or e-books was significantly reduced: from 9 instances in the *Pre-Implementation Survey*, or 12.68%, to three instances in the *Post-Implementation Survey*, or 3.75%. Among Second-Order Barriers, teachers' lack of confidence and concerns about student misuse were still the most commonly referred to barriers. If student misuse and student distractions were combined, then that would be the most common Second-Order Barrier, at a total of 15.00%, and lack of confidence would be second most

common, at 11.25%. This is almost the reverse of the distribution between those two barriers in the *Pre-Implementation Survey*, where student misuse was identified 11.27% of the time, and teachers' lack of confidence was identified 16.90% of the time.

Barriers Overall					
Barrier	**# of times identified**	**Question #**	**% of type of barrier**	**% of total barriers**	**Comments**
FIRST-ORDER					
Unfamiliar with use of device	0	n/a	0.00%	0.00%	**Question 12 and 21 of the Post-Implementation of iPads in the Classroom survey take into consideration First-Order Barriers only. There are 21 barriers identified in these two questions. 67.5% of all barriers in the post-implementation survey were First-Order Barriers.** *****If the 21 barriers are removed from the Pre-Implementation of iPads First-Order Barriers, there would be a total of 35 barriers indicating that 55.93% of barriers were First-Order Barriers.*****
Lack of resources on using in educational context	0	n/a	0.00%	0.00%	
Lack of Knowledge on iPad use	0	n/a	0.00%	0.00%	
Issues with saving/deleting data	8	3, 4, 22	14.81%	10.00%	
Lack of Resources (not enough iPads for each student, slow/inconsistent Internet, issues downloading software	15	3, 4, 12, 17,20, 21	27.78%	18.75%	
Lack of training	11	12, 20, 21	20.37%	13.75%	
Lack of time	2	20	3.70%	2.50%	
Assessment Concerns	3	3, 17, 22	5.56%	3.75%	
Would like to know how other used	1	12	1.85%	1.25%	
Specific Lesson Ideas	3	12	5.56%	3.75%	
Protective Cases	1	12	1.85%	1.25%	
Control Restrictions by PDSB	1	4	1.85%	1.25%	
Lack of Flash on iPads	1	4	1.85%	1.25%	
Apple Product in PC World software glitches	1	4	1.85%	1.25%	
Equality of use	2	21	3.70%	2.50%	
Want a booklet/guide to follow	2	12	3.70%	2.50%	
Lack of Apps or e-books	3	3, 4	5.56%	3.75%	
Subtotal	**54**		**100.00%**	**67.50%**	
SECOND-ORDER					
Did not want to change educational programming	0		0.00%	0.00%	**32.50% of all barriers in the Post-Implementation of iPads in the Classroom survey were First-Order Barriers.** ***** If the abovementioned**
Not sure how to use in program	0		0.00%	0.00%	
More time with students	0		0.00%	0.00%	
Unsure of what they are apprehensive about	0		0.00%	0.00%	

Organization of class time	0		0.00%	0.00%	**barriers were removed in the overall picture than Second-Order Barriers would account for 44.07% of the overall barriers.**
Appropriate student use concerns	7	3, 22	26.92%	8.75%	
Lack of confidence, knowledge, or skill	9	4, 17, 20, 22	34.62%	11.25%	
Attitude	4	3, 4, 17, 20	15.38%	5.00%	
Student Distractions	5	4	19.23%	6.25%	
Fundamental change	1	20	3.85%	1.25%	
Subtotal	**26**		**100.00%**	**32.50%**	
Total	**80**			**100.00%**	

Table 17: Overall Barriers from Post-Implementation of iPads in the Classroom Survey

Stages of Concern

Questions 4, 5, 6, 7, 8 and 10 of the *Pre-Implementation of iPads in the Classroom Survey* and Questions 11, 13, 17, and 20 from the *Post-Implementation of iPads in the Classroom Survey* were coded to analyze the teachers' Stages of Concern. Many of the responses to the various questions elicited more than one Stage of Concern, even from the same teacher. For the purposes of this project, the highest level of concern that a teacher identified was used as his or her stage of concern. This reflects the nature of the CBAM framework, in that it recognizes that when a new technology is adopted, the adopters may go up and down the scale; however, the higher stages are not likely to be reached without proceeding through the previous stages.

Pre-implementation of iPads in the classroom survey. The Questions used to assess teachers' pre-implementation Stages of Concern asked why they did or did not plan to use iPads and if not, what it would take for them to want to use them, what they were looking forward to about using the iPads, how they planned to use the iPads, apprehensions about using the iPads, and any anticipated changes in pedagogy.

Overall, the teachers' concerns were mostly either at Stage 3: task-based concerns (36.9%), or Stage 4: rooted in consequences for the students or program of teaching (39.3%). The teachers who did not plan to use the iPads were unaware of the technology or were only asking informal, preliminary questions about them, and were therefore at a Stage 0 or 1. Many of the teachers who expressed Stage 3 or Stage 4 concerns also expressed Stage 2 Concerns (personal concerns), but even pre-implementation, most of the teachers who reached Stage 2 had already moved beyond that Stage, either to Stage 3 or 4.

Stages of Concern: Pre-Implementation														
	Stage 0 – unaware or does not want to learn		Stage 1 - Informal - questions we ask when we hear about something new		Stage 2 - Personal Concerns, e.g. how might the technology affect me?		Stage 3 - Management/ task-based concerns		Stage 4 - Consequences, thoughts on how to make a program work better for students		Stage 5 - Collaboration, how to make a program work better by working with colleagues		Stage 6 - Refocusing, where to go next after successful implementation	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Q4	1	50.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Q5	0	0.0%	0	0.0%	2	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Q6	0	0.0%	0	0.0%	4	20.0%	7	35.0%	9	45.0%	0	0.0%	0	0.0%
Q7	0	0.0%	1	5.0%	0	0.0%	5	25.0%	14	70.0%	0	0.0%	0	0.0%
Q8	2	10.0%	2	10.0%	2	11.1%	14	70.0%	0	0.0%	0	0.0%	0	0.0%
Q10	1	5.0%	1	5.0%	3	15.8%	5	25.0%	10	50.0%	0	0.0%	0	0.0%
Total	4	N/A	5	N/A	11	N/A	31	N/A	33	N/A	0	N/A	0	N/A
% of total	**4.8%**		**6.0%**		**13.1%**		**36.9%**		**39.3%**		**0.0%**		**0.0%**	

 # = number of responses indicating the relevant Stage of Concern

% = Percentage of responses that fell into a stage of concern on a question by question basis

NOTE: Where more than one stage of concern was identified in a response, only that respondent's highest level of concern is recorded.

Table 18: Stages of Concern: Pre-Implementation

Post-Implementation of iPads in the classroom survey. The Questions used to assess teachers' post-implementation Stages of Concern asked how the teachers' thinking

changed after using the iPads, what supports the teachers took advantage of, about the teachers' future plans for using iPads, and, for the five teachers who chose not to use them, why they made that choice. If a teacher's answer was not applicable to a given question, such as "Has your own thinking changed since having iPads in your classroom?" they were categorized as N/A, rather than concluding that if no change in thinking had occurred, the teacher was not interested or at a Stage of Concern of 0. Nearly one third of teachers who used the iPads did not indicate that their thinking had changed after using them.

Overall, the post-implementation survey showed advancement in the teachers' Stages of Concern. Even though five teachers did not use the iPads, only one teacher was completely disinterested in their use. No one was at Stage 1: every teacher had begun meaningfully considering using iPads, except the one teacher who was completely disinterested. The majority of teachers reached at least a Stage of Concern of 4 (59.2%), with 40.8% stopping at Stage 4, and 18.4% going beyond to Stage 5, where they had begun collaborating with each other and even with students, to improve their programs of teaching and their use of the devices.

Stages of Concern Post-Implementation															
	Stage 0 – unaware or does not want to learn		Stage 1 - Informal - questions we ask when we hear about something new		Stage 2 - Personal Concerns, e.g. how might the technology affect me?		Stage 3 - Management / task-based concerns		Stage 4 - Consequences, thoughts on how to make a program work better for students		Stage 5 – Collaboration how to make a program work better by working with colleagues		Stage 6 - Refocusing, where to go next after successful implementation		N/A
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
Q11	0	0.0%	0	0.0%	0	0.0%	5	45.5%	6	54.5%	0	0.0%	0	0.0%	5
Q13	1	6.3%	0	0.0%	1	6.3%	3	18.8%	5	31.3%	6	37.5%	0	0.0%	0
Q17	0	0.0%	0	0.0%	1	6.3%	3	18.8%	9	56.3%	3	18.8%	0	0.0%	0
Q20	0	0.0%	0	0.0%	3	50.0%	3	50.0%	0	0.0%	0	0.0%	0	0.0%	0
Total	1	N/A	0	N/A	5	N/A	14	N/A	20	N/A	9	N/A	0	N/A	
% of total	**2.0%**		**0.0%**		**10.2%**		**28.6%**		**40.8%**		**18.4%**		**0.0%**		

 # = number of responses indicating the relevant Stage of Concern
% = Percentage of responses that fell into a stage of concern on a question by question basis
NOTE: Where more than one Stage of Concern was identified in a response, only that respondent's highest Stage of Concern is recorded.

Table 19: Stages of Concern Post-Implementation of iPads

Levels of Use

The Levels of Use are presented in the same manner as the Stages of Concern. Questions 4, 5, 7, and 16 of the Pre-Implementation Survey, and Questions 2, 13, and 17 of the Post-Implementation Survey elicited responses about the teachers' Levels of Use. Any response that revealed more than one Level of Use was recorded as the highest expressed Level of Use.

Pre-implementation of iPads in the classroom survey. Because the teachers had not yet begun to use the iPads at the time of the Pre-Implementation Survey, their pre-implementation Levels of Use were overwhelmingly at the preparation stage (81.4%).

The exceptions were the two teachers who did not plan to use the iPads, and the few responses that indicated that some of the teachers who planned to use iPads had not completely advanced to the preparation Level (Level 2). Question 7 asked about the teachers' planned use of the iPads, and 90% of teachers who planned on using the iPads planned to use them at a Level 4a (routine use).

Levels of Use Pre-Implementation																
	Level 0 - Non-use		Level 1 - Orientation		Level 2 - Preparation		Level 3 - Mechanical		Level 4a - Routine		Level 4b - Refinement		Level 5 – Integration		Level 6 - Renewal	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Q4	1	50.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Q5	1	50.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Q7 - actual	0	0.0%	1	5.0%	19	95.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Q16	3	15.8%	0	0.0%	16	84.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	**5**	**N/A**	**3**	**N/A**	**35**	**N/A**	**0**	**N/A**	**0**	**N/A**	**0**	**N/A**	**0**	**N/A**	**0**	**N/A**
% of total	**11.6%**		**7.0%**		**81.4%**		**0.0%**		**0.0%**		**0.0%**		**0.0%**		**0.0%**	
Q7 - planned	0	**0.0%**	1	**5.0%**	0	**0.0%**	1	**5.0%**	18	**90.0%**	0	**0.0%**	0	**0.0%**	0	**0.0%**

 # = number of responses indicating the relevant Level of Use

% = Percentage of responses that fell into a level of use on a question by question basis

NOTE: Where more than one level of use was identified in a response, only that respondent's highest level of concern is recorded.

Table 20: Levels of Use: Pre-Implementation of iPads

Post-Implementation of iPads in the classroom survey. The questions in the Post-Implementation Survey that related to Levels of Use were only asked of teachers who used the iPads. Question 2 asked the teachers how they used the iPads, and for the most part, the teachers who used them had met or exceeded their predicted Level of Use. No one who used the iPads used them at a Level of Use that was lower than Level 3, and 83.3% of the teachers who used the iPads were at Level 4a or higher. The overall percentages included teachers' responses to what supports they had sought out and what

future use they planned. Even taking this into account, the overall Levels of Use were high, predominantly falling in Level 3 (19.5%), 4a (25.7%) 4b (34.1%) and 5 (34.1%). After only a few months of use, more than one third of teachers had at least begun integrating the iPads into their teaching practices and collaborating with others on how to do so.

Levels of Use: Post-Implementation																
	Level 0 - Non-use		Level 1 - Orientation		Level 2 - Preparation		Level 3 - Mechanical		Level 4a - Routine		Level 4b - Refinement		Level 5 - Integration		Level 6 - Renewal	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Q2	0	0.0%	0	0.0%	0	0.0%	3	16.7%	4	22.2%	8	44.4%	3	16.7%	0	0.0%
Q13	1	6.3%	0	0.0%	1	6.3%	3	18.8%	2	12.5%	1	6.3%	8	50.0%	0	0.0%
Q17	0	0.0%	0	0.0%	3	18.8%	2	12.5%	3	18.8%	5	31.3%	3	18.8%	0	0.0%
Total	1	N/A	0	N/A	4	N/A	8	N/A	9	N/A	14	N/A	14	N/A	0	N/A
% of total	**2.4%**		**0.0%**		**9.8%**		**19.5%**		**25.7%**		**34.1%**		**34.1%**		**0.0%**	

 # = number of responses indicating the relevant Level of Use

% = Percentage of responses that fell into a level of use on a question by question basis

NOTE: Where more than one level of use was identified in a response, only that respondent's highest level of concern is recorded.

Table 21: Levels of Use Post-Implementation of iPads

Case Studies

The survey results offer an overall picture of barriers to implementation as well as teachers' Stages of Concern and Levels of Use; however, the open-ended interviews gave more detailed descriptions of two of the teachers' experiences. These interviews are presented in the following two case studies.

Case study 1. The first case study teacher is a music teacher who is in her early thirties. For the purposes of this study, she will be referred to as Teacher1. She has been teaching for 6 years and has been at this school for the last 5 years. The school's music program offers both a general music class and an instrumental band program. From my

observations, there is some technology used in her classroom, but it is not part of her core teaching practice and often she does not use the most up-to-date technologies. Each year, this teacher offers one unit, consisting of two lessons, where the students use computers to compose their own music. Her teaching practice uses document cameras, a projector, videos, and mp3 players.

The interview with Teacher1 was held after she completed the *Post-Implementation Survey*. Originally, Teacher1 did not plan to use iPads, but once they arrived at the school, she changed her mind. She decided she was going to use them, but "wasn't sure in what capacity. It was suggested to [her] by a colleague that [she] try the Garage Band Program with the students." Before the iPads arrived Teacher1's Stage of Concern was at Stage 0, but by the end of the year, her Stage of Concern had advanced to a Stage 5. She also went from a Level of Use of 0 to a Level 5 before the end of the school year.

When asked to discuss her experiences with technology in the classroom generally, and iPads specifically, Teacher1 said that she tries to teach with a hands-on approach using the technologies mentioned above. In describing her experiences with the iPad, she says: "At our school, there aren't enough iPads for each student to have one, so I think that's why I don't use them as often as other classes do." When describing the differences between using the iPad and other technologies, Teacher1 noted that students were familiar with iPads and that worked to her advantage. She experienced some challenges when introducing students to GarageBand because they were not all familiar with the program, but in the end, they were excited and engaged in the lesson. Teacher1's greatest successes with using the iPads was the fun her students were having with the program,

the level of engagement she saw in their work, and the positive atmosphere of her classroom.

Teacher1 commented that she shared her experience using the iPads and GarageBand with her teaching partner for next year, and that she had received some feedback from other colleagues, such as how to open the iPad cart and how to wipe the screens.

Teacher1 experienced similar barriers and limitations when using the iPads to those identified in the surveys. In the lesson that she completed with students, they were given the opportunity to create songs using the iPad. Teacher1 would have preferred if each student had been able to create his or her own song. Because of the limited number of iPads, students had to create a song with a partner. She also commented that she wanted to have more time with the iPads so students could have shared their creations with one another.

When asked about support from the school's administration, Teacher1 felt that the best support they provided was the fact that they purchased iPads for the school. She felt that administration could have provided a quick workshop and professional development not only for the school, but specifically for her area of teaching. Looking to the future, she echoed what other teachers felt would be appropriate: to purchase more iPads so students can work independently with a one iPad per student ratio.

Teacher1 highly recommended the iPads because the students were engaged, their horizons were expanded, and low-income families were provided opportunities that may not otherwise have been available to them. Providing students with opportunities to use technology that they may not have access to at home can help close the digital divide,

creating more equitable opportunities for students, regardless of their socio-economic backgrounds.

Case Study 2: The second case study focuses on an interview with a Grade 6 rotary French teacher who also taught Drama and Dance to three classes during the 2011-2012 school year. For the purposes of this discussion, she will be referred to as Teacher2. Teacher2 is in her late-twenties and the 2011-2012 school year was her third year of teaching. During her previous two years of teaching, she taught Language Arts, History and Geography, and Drama to both the all-boys gender class, and to mixed-gender classes.

I have frequently observed Teacher2's classroom and have engaged in discussions with her about the various technologies she uses. This teacher is one of a few teachers at this middle school to use MobiViews, which are portable interactive whiteboards, in her teaching practice. She frequently designs activities for her French students to use with two Mobis. The use of technology is deeply woven into her daily teaching practice, and she aims to do so in a meaningful way. Students are greeted to her classroom each day with instructions that are projected on a screen from her computer. This helps students prepare for the class before she begins teaching a lesson. She has found that projecting the day's instructions in this way helps students refocus after traveling to her room, and helps prevent students from getting off task.

One of the most innovative uses of technology in Teacher2's classroom, besides using the Mobis, is her creation of French songs. Teacher2 hosts two online radiobroadcast shows per month: one is a cooking show where she introduces new dishes, and the other highlights an hour's-worth of Canadian Independent (Indy) bands. Teacher2

writes her French grammar lessons as new lyrics to popular songs to help the students learn and remember rote-based learning tasks. She then records herself singing these lyrics over the instrumental tracks of the songs. Students can listen to the songs in class, or from home using YouTube. One can frequently overhear students singing her French songs in the hallways. Teacher 2 has noted improved student performance since she started creating and using these songs.

In our interview, Teacher2 noted having great success using technology in her classroom. In addition to the examples above, she mentioned using netbooks and a game website called "Zondle" to practice French vocabulary with behaviour students, using videos and websites about French, or in the French language, and using Class Dojo which helps with classroom management, allowing the teacher to acknowledge positive and negative behaviours in front of the class while using the MobiView.

Teacher2 originally planned to use iPads in her classroom, and when asked to share her personal experiences of the iPads, she admitted to not having much experience with the devices, other than playing Fruit Ninja and Temple Run on her partner's iPad. She commented that she has not found the time or had the patience to try much on the iPads after her unsuccessful search for good French Apps. She also encountered problems loading and using the Zondle game, because the iPads do not support the Flash plug-in, which this program required. She felt that she would have had success with the iPads if she had been able to use Zondle with her class of behaviour students. The French apps that this teacher found were either designed for preschool age children or adults, and were not suitable for the junior and intermediate grade levels.

Another concern that this rotary teacher experienced while considering iPad use in her classroom was the length of time that she would need them in order to have all of her classes use the iPads, since she teaches 300 students. She did not want to monopolize the set of iPads that the school has.

Other barriers that Teacher2 mentioned included that she felt she did not have enough time during the school year to do self-directed training on the iPad, felt that the school did not provide adequate training, and she was worried that she would break one of the iPads.

Teacher2 felt that she had her administrators' support and enthusiasm for using the iPads, but she also felt at a disadvantage as a French teacher, and she had not discovered what she felt was a good way to use the iPads to teach French. To feel comfortable using the iPads, she felt she would have benefitted from a designated iPad for the French team of teachers to use, and some specialized or individualized training. She felt that this school's next steps should be to provide additional training on the iPads, and to possibly create an iPad expert team. Her advice to other administrators wanting to use iPads is to provide teachers with iPads to play around with on their own time and then provide them some solid training on a few useful apps that would be successful and simple to use to get started.

At the time of the interview, Teacher2 did not think that she would use the iPads next year unless she discovered some good French apps to use. She considered using them to record oral presentations, but is worried about monopolizing the iPads for long periods of time. Teacher2 is concerned about using iPads because of their delicate nature, and the lack of good French apps. She would prefer using the desktop computer in her

room, because the students are familiar with the technology and it is easily accessible. She also prefers to use the MobiView, because early in the school year she received what she considered to be solid training from the school's Information Technology Resource Teacher. Other teachers did not go for the training, which allowed her to have free use of the technology for the whole school year. She admits to monopolizing the MobiViews all year, but they are not in high demand, and she felt that the students really liked using them.

When provided with the opportunity to share anything else about the iPads, Teacher2 said she needed more time to practice with the iPads before using them, so she could find more ways to integrate them into her program. She again recommended that having an "iPad support crew to help come up with ways to use them would be very useful!"

Other Emerging Themes Related to iPad Implementation Improvement

Although the focus of this project is on exploring teacher attitudes through a modified CBAM framework, themes have emerged from the survey results that do not fall directly into that framework, but which provide illuminating context for the data. For example, the survey answers presented in this section address the use of technology at the school generally, the high-level of enthusiasm the students had for using the iPads, and more detailed examples of how the teachers used the iPads and thought about their use. This context is important both because it informs one of the goals of this project: to make best practices' recommendations for this school and others, and also because it suggests areas for future research in an area of technology implementation that has only just begun to be explored.

Current technology in the classroom (Pre-Implementation Survey, Question 2)

Pre-implementation, technology was widely used in the school. The most commonly used technologies were, in order from most to least: computers (91.3%), Internet (91.3%), YouTube (87.0%), document camera/projector (82.6%), and Word documents (78.3%). The least frequently used were Mobis with clickers (0.0%), video game systems, including Xbox, Wii, and PlayStation (0.0%), and Mobis (4.0%).

Planned use of iPads (Pre-Implementation Survey, Questions 3 and 7). Twenty participants answered each of Questions 3 and 7, which asked about the extent teachers planned to use the devices, and how they planned to use them.

With respect to the planned amount of use, only 8.7% participants planned not to use the iPads. Slightly over half, or 52.2% of teachers planned to use them occasionally (1-4 times). The remaining 40% of teachers planned to use them between four and eight times (17.4%), weekly (13.0%), and daily (8.7%). Given the limited availability of the iPads, it can be assumed that the teachers who planned to use iPads daily planned to use iPads that they own. The use of one teacher-controlled iPad compared with the use of iPads by students is a potentially fruitful area for further study, though not touched on in this project.

With respect to how the teachers planned to use the iPads, teachers wanted to use iPads for grammar Apps (English and French), as research tools, and to create and watch video/audio-recordings for newscasts, films, advertisements, and digital stories, across all subject areas. This suggests that as a whole, the teachers planned to use iPads as replacements for existing tools, but also in potentially fundamental, new ways.

Actual Use of iPads (Post-Implementation Survey, Questions 1, 2, and 8)

Out of 26 participants in the *Post-Implementation Survey*, 76.9% used the iPads and 23.1% did not. Of the teachers who used iPads, video recording was used by 56%, at least 50% used apps, and 28% used iPads for research. Eight teachers commented on using the iPads for language-based subjects, and five teachers commented on using iPads for math or science-based subjects. Overall, the language teachers found it easier to find Apps that applied to their programs. When asked about subject areas, one teacher commented: "history - it creates a more engaging topic and is much less dry."

Preparedness for iPad Implementation (Pre-Implementation Survey, Question 11). "Lack of training" and "lack of confidence concerning the use of the devices" were two of the most common barriers cited in the surveys. Despite those perceived or actual barriers, some of the self-directed steps teachers took to prepare for iPad use included: investigating what apps were available, consulting with students, and creating rules for their use in the classroom. Only one teacher of 19 attended an iPad workshop outside of the school, which he or she found to be helpful. A few teachers contacted one of the Peel Board's Information Technology Resource Teachers for help with the iPads. Most teachers also mentioned that they explored the iPad on their own before they used it in the classroom.

Expected Results, Expected and Actual Changes in Pedagogy (Pre-Implementation Survey, Questions, 9, 10, 16; Post-Implementation Survey, Questions 9, 15). With respect to the teachers' expected results of using iPads, fifteen out of twenty teachers (75.0%) anticipated that their students would be more interested, engaged, creative, and willing to take risks when using iPads, all of which would lead to

higher levels of student achievement. The respondents also felt that the iPad could provide more comfortable ways for students to express themselves when interacting in a group, where they may otherwise have found it difficult to interact with others.

With respect to changes in pedagogy, 45% of teachers expected that the introduction of iPads would help them integrate technology into their teaching practices. The most common response, at 55% of teachers, anticipated that they would rely more on differentiated instruction and be able to use iPads as another tool to accommodate students' differentiated learning styles.

Many teachers expected that their lessons would be more student-driven and that they would be able to create opportunities for mutual and shared learning, both between teacher and student, and among students. Finally, teachers expected an increase in inquiry-based learning from the students.

Despite teachers' high pre-implementation hopes, when asked how their classrooms had changed after using iPads, most teachers said nothing changed. Three said the students were more engaged. One said that less classroom management was needed, but another said that more classroom management was needed.

When asked about changes in their pedagogical beliefs, many teachers indicated that there was no change, and those who did indicated that although they had been unsure about using iPads at first, having used them, they intended to do so again. Several teachers acknowledged that the use of technology in teaching was a significant part of their pedagogical beliefs, both before and after using the iPads.

With respect to changes in assessing students, two teachers commented on using the iPads for taking anecdotal notes about students. Two teachers commented that they

did not use the iPads for assessment because they had not created rubrics for their use. One teacher accommodated and modified an assessment they had taken based on the use of the iPad: an ISSP student in that teacher's class completed a PowerPoint presentation using Prezi and SmartIdeas, instead of writing out his or her responses.

When asked whether they planned to adapt their old lessons to the iPad, three of nineteen teachers were not sure, eight planned to incorporate the iPads into their existing lessons, and eight planned to create new lessons that were tailored to iPad use.

Advantages of iPads (Post-Implementation Survey, Questions 3, 4, 5, 6, and 7) After using the iPads, Teachers noted numerous advantages. 50% of respondents who used the iPads noted the increased engagement of the students. All respondents except for three commented that the students were excited to use the iPads, and one of those three respondents uses her personal iPad and does not allow the students to use it. Another of the three is not a classroom teacher. The third of the three stated that some students chose not to use the iPads at all.

Ten out of 18 teachers observed that their students were more focused when using the iPads. Two teachers did not see any changes in students' attitudes, and four were not able to comment. One teacher said that the students took the iPads for granted, and were doing things that they should have been doing at home.

Question 7 asked if certain types of learners were more engaged with iPads. Teachers unanimously agreed that most learners were more engaged when using iPads; however, notable improvements in student focus were seen in visual learners, kinaesthetic learners, students with ADHD, disorganized students, and quiet students. One teacher found that male students were more engaged with the iPads than female

students. Another teacher commented that the only type of learner who was not motivated by the iPads was "cautious, non-experimental learners who shy away from innovation or creativity." Another teacher noted that a quiet student who was skeptical about using the iPads and uninterested beforehand had a change of opinion after using one.

Other advantages that the respondents mentioned were that iPads are portable, user-friendly, and had useful video-recording features.

Feedback from Parents (Post-Implementation Survey, Question 16). Parent feedback with respect to the iPads was limited. Twelve of the sixteen respondents indicated that they had no contact with parents. Two commented that parents were supportive/encouraging. One teacher commented that parents are looking for Apps to help their child. The final respondent's comment was not clear enough to be interpreted.

Support from Administration (Pre-Implementation survey, Question 12; Post-Implementation Survey, Question 21). Administration at this school was widely recognized and appreciated for obtaining the technology, including the devices and wireless hub, and making it available to teachers, including setting up the hardware, and keeping them in a central location for access. There was a disconnect with respect to other efforts by administration, as some teachers acknowledged that administration connected teachers with the IT resource teacher, and dedicated a day for the teachers to work with the Information Technology Resource Teacher for one 46 minute period; however, some teachers felt that administration did not do much besides provide them with the equipment.

Among teachers who did not use the iPads, three wanted administration to have provided training to help them use the iPads, including allowing teachers to borrow one.

Another one of the teachers who did not use them felt that there was nothing more administration could have done.

Supports (Pre-Implementation Survey, Question 14). When asked what supports they were interested in, teachers were most interested in how other schools have used iPads in the classroom (89.5%), having access to professional development related to the use of apps in the classroom (78.9%), and the establishment of school rules (73.7%).

Plans for Safe Use of iPads (Pre-Implementation Survey, Question 13). The 19 respondents to this question identified twenty-one strategies for ensuring that the iPads were used safely. Many teachers' expected that using the iPads would give them increased opportunities for teaching Internet safety. Their strategies for safe use fell into three categories: written agreements, teacher-driven strategies, and technology-driven strategies. Two of the respondents did not plan to take any steps to ensure safe use of the iPads.

Of the 17 teachers who intended to address iPad safety, 14 intended to employ teacher-driven strategies, including monitoring student behaviour, ensuring the students stay on task and away from inappropriate websites, discussing safety and the fact that iPad use is a privilege, discussing rules and consequences, and reviewing acceptable and unacceptable use.

Three teachers used written agreements to enforce the classroom rules concerning iPads.

The two teachers who planned to use technology-driven solutions planned to turn off the Internet so students could not access inappropriate websites.

Future Planned Use (Post-Implementation Survey, Questions 17, 18). When asked whether they will use iPads in the future, 13 of 16 respondents indicated they would. One indicated that he or she would only use them if wireless Internet were available. One teacher preferred netbooks to iPads, indicating that iPads were too clumsy. The last was unsure whether he or she would use iPads in the future.

Most teachers who planned to use iPads in the future planned to use them for assessed tasks, intended to find more Apps over the summer, and intended to consult or collaborate with colleagues.

Teachers Who Did Not Use iPads (Post-Implementation Survey, Questions 20-25). The iPads were not used by six teachers, who cited issues with their availability, and other time constraints. One teacher wanted a schedule to sign out the iPads. One teacher mentioned his or her fear that they would be damaged by classes with behavioural students. One teacher did not use them because of a lack of subject-appropriate apps (French language instruction at the middle school level). Two teachers did not use them because of their own lack of knowledge in how to use the iPads.

Five of the six teachers who did not use the iPads in the 2011-2012 year indicated that they planned to try to use them the following year. The teacher who did not plan to use them was a rotary teacher who teaches ten classes. To use the iPads effectively, this teacher would have to sign out the devices for too long a time to be able to do so reliably. This teacher also felt "inept" to use them. Four of the six teachers who chose not to use iPads in 2011-2012 indicated that their students did not mention them. Two of the six indicated that their students wanted to try them.

Misuse of Equipment (Post-Implementation Survey, Question 19). One iPad was dropped, but it was not damaged. One student filmed himself making a rude hand gesture. Three teachers mentioned students being off-task.

Anything Else? (Pre-Implementation Survey, Question 17)

Newer teachers struggled with the pressures of beginning their teaching practices, and felt that they did not have time to learn how to use and incorporate new technology on top of the heavy work load at the beginning of their careers. Several teachers also mentioned that they felt it was their responsibility to engage with students around iPad use, though they struggled with finding the time to do so. One respondent anticipated that she would be embarrassed in front of her students if she tried to use a tool that she could not use as well as some of the students did. Many of the teachers expressed that they are looking for resources to help them learn new ways to use iPads. Many mentioned a desire for professional development and online resources that were readily available. Several teachers also suggested that other tablets might be more cost-effective than iPads.

Discussion

In this section, I analyze the findings and research discussed in the project with respect to the following research questions:

1. How did teachers' self-directed integration of iPads take place?
2. What types of barriers were encountered during integration? What were the teachers' attitudes toward barriers, and how did they change from pre-implementation to post-implementation?
3. What steps can be taken to improve the implementation and use of iPads at this school, and what recommendations would be appropriate for other schools that either have begun their own implementation of iPads, or are contemplating doing so? This research question is directed at identifying Innovation Components that might achieve these goals, and developing recommendations that may be used in a best practices guide.

The survey and interview results have been quantified and described in the findings section above. This section focuses on analyzing the data by using the two case studies as a starting point, and referring to the survey data and literature to show the broader application of the ideas that arose in the case studies.

Most of the data that has been quantified deals with teachers' movement through the Levels of Use and Stages of Concern, and the Barriers they faced. Although this data is crucial to an understanding of iPad implementation, it is also important to emphasize the advantages that teachers noted about the iPads. The most commonly cited of these was the high level of student engagement, especially in students with learning disabilities and challenges, such as learning English for the first time. Overall, the teachers and students

saw immediate benefits from using the iPads and had a generally positive experience using them.

How Did Teachers' Self-Directed Implementation of iPads Take Place?

Pre-Implementation, teachers planned on using the iPads in mostly Language and Math classes, and by using apps. Some teachers also planned to use them for their video and audio recording and playback capabilities. Many teachers also planned to use the iPads as a research tool.

Pre-Implementation, the largest percentage of teachers started at a stage 4 Stage of Concern (Consequence/Thinking about how to make it better for the learner), and at a planned Level of Use of 4a (Routine). Post-implementation, the largest percentage of teachers were still at a Level 4 Stage of Concern, but the number of teachers at levels 0 through 2 dropped considerably, and many teachers had advanced to a Stage 5. This was also reflected in the teachers' Levels of Use. The actual Levels of Use were higher than predicted, and Levels 4b (Refinement) and Level 5 (Collaboration) were the most common levels achieved, each at 34.1% of respondents.

Teacher1 implemented iPads into her classroom, though she planned not to, and Teacher2 did not implement iPads, though she had intended to. The data suggests that Teacher1's decision may be the more common original intention. At the outset of this project, 91% of teachers indicated that they were going to use iPads in their classroom; however, in the *Post-Implementation Survey*, only 76.9% of teachers had used them.

Before the iPads arrived, Teacher1's planned Level of Use was 0 (Non-Use). She was not interested in implementing iPads. After the iPads were recommended to her by colleagues, Teacher1 decided to implement the iPad into her own classroom. She had

also purchased an iPhone before the iPads arrived, which may have helped her become more comfortable with the iPad's operating system, bringing her to a Level of Use of 1 (Orientation). Teacher1 collaborated with her colleagues to develop ideas for implementation, and to become more comfortable with the devices. She created a music-composition lesson using the GarageBand App, and let students use the iPads to compose rhythms using various digital instruments. This brought her to a Level of Use of 2 (Preparation) and then 3 (Mechanical/First Attempts at Use). Post-implementation, Teacher1 indicated, "I will use them again. The time spent on them will be more structured and more geared toward an assessment of some sort," suggesting a level 4(b) Level of Use (Refinement). Her survey and interview results did not mention level 4(a) (Routine), which would be expected given that she would not have had enough time or access to iPads to develop routines. Post-implementation, Teacher1 spoke to colleagues to share her experiences and lesson plan ideas, and discuss ways to assess what students have done using the iPads. This suggests that Teacher1 had started to approach a Level of Use of 5 (Collaboration).

Teacher1's movement through the Levels of Use is also reflected by her movement through the Stages of Concern. As discussed in the Theoretical Framework section of this project, there is overlap between Levels of Use and Stages of Concern. As Teacher1 moved from a Level of Use of 0 to a Level 5, she also moved from a Stage of Concern of 0 (Disinterest) to a Stage 5 (Collaboration). In her *Pre-Implementation Survey*, Teacher1 indicated that she would not be using the iPads because her program was already in place, and she did not have enough time to do anything meaningful with the iPads, putting her at a Stage 0 (Disinterest). After the *Pre-Implementation Survey*, Teacher1 engaged with

colleagues about some preliminary concerns that were even as simple as how to wipe off the iPad screens, bringing her to a Stage 1 (Informal/Early Inquiries). Teacher1 did not express any Stage 2 Concerns (Personal). Pre- and post- implementation, Teacher1 expressed Stage 3 Concerns (task-based) about not having enough time, not having enough iPads, and assessment concerns. Post-implementation, because of her positive experience with the iPads and student engagement, Teacher1 looked forward to using iPads in the future. She had begun thinking about making her use of the iPads more structured and geared towards tasks that could be assessed, which exhibited a Stage 4 of Concern (Consequence): she was concerned about how to capitalize on the students' engagement in the context of more meaningful, structured lessons. Teacher1 at least began to reach Stage 5 of Concern (Collaboration) both with teachers and students. In addition to her responses indicating collaboration with other teachers, she commented "Definitely using them again! Kids were completely engaged; couldn't wait to show each other their compositions; they taught me a few things about the program! It was great."

Teacher1's movement through the Levels of Use and Stages of Concern was reflected in the survey results generally. No respondents indicated that they had used an iPad in their classroom before the implementation, and so a majority of teachers (81.4%) started at a Level 2 (Preparation), and no teacher started above Level 2. When asked about their planned Levels of Use, 90% of respondents who planned to use iPads indicated that they planned to use them at the 4a (Routine) level. After using the iPads, the teachers had generally moved past their own planned Level of Use. 25.7% of teachers' responses indicated that they were at a Level 4a (Routine), 34.1% indicated a Level 4b (Refinement), and 34.1% indicated Level 5 (Collaboration).

What stands out most about Teacher1's experience is how she went from a Level of Use of 0 to a Level 5. Her movement was sparked by her interactions with other teachers, and supported by her students' enthusiasm. In fact, many respondents indicated that the students were more engaged when using iPads, and this may have led to the generally fast movement through the Levels of Use that many teachers appear to have experienced.

Overall, teachers who used the iPads expressed that students were enthusiastic about using them. One thing that was not addressed is the fact that iPads are new and therefore the students see them as being something exciting to use, in turn creating stronger engagement in their learning. This may be an issue that is relevant to the middle school level. The excitement and novelty of iPads is an area for future consideration.

Also, as with Teacher1, the surveys indicated that the teachers' progress was mostly self-directed. Some teachers borrowed the iPads and tried them out on their own. Many teachers, including the two case study teachers, used one of their planning time periods with the IT Resource Teacher, taking advantage of the day administration invited him to the school. Some teachers shared with each other. They talked about what worked and what did not. They sought out Apps that they hoped would be meaningful, and looked online for lesson ideas. They used the iPads' video capabilities. Essentially, the teachers' self-directed approach was consistent with the hopes expressed in the research that they would be a tool for differentiated instruction, collaboration, and empowering students in their own learning (Hill, 2011; Chen, 2011; Broda, Schmidt, & Wereley, 2011).

Teacher1's success with GarageBand and Teacher2's frustration at not finding appropriate French Apps supports Hughes' (2005) idea that with specific content

examples, teachers will be more likely to use a technology. This was reflected in the survey results generally, as other teachers noted that it was only after seeing demonstrations of how content-specific apps could be used in classroom instruction that they were convinced to use the iPads in their own teaching.

Teachers found particular success for students with special learning needs, whether behavioural, developmental, or ESL, which was also consistent with the literature, specifically, the numerous studies on iPads for special needs students (Bellini & Akullian, 2007; Chen, 2001; Kagohara, 2011; Kagohara, Sigafoos, Achmadi, O'Reilly, & Lancioni, 2012; McClanahan, Williams, Kennedy & Tate, 2012; Price, 2011; Shah, 2011). In particular, the teachers who work with English as a Second Language (ESL) students note successes with the iPad providing quick translations, and their ability to provide modifications and accommodations with iPad apps. Teachers echoed the research by McClanahan (2012) that their ADHD students are far more engaged in their learning when provided with an opportunity to use an iPad and engage the kinaesthetic learner through content manipulation (Bennett, 2012).

Another important discussion point arising from this interview was Teacher1's suggestion for Professional Development targeted at her subject area. This request echoes Hughes' (2005) study that indicates the importance of providing examples of how technology can be used within a teacher's specific context, which in this case could include the GarageBand App, or music in general.

Teacher2's pre-implementation Level of Use was a 2 (Preparation). She had started to think about how the iPads could be used in the classroom, and had attempted to find Apps, French-games in particular, and thought about how the video features could be

used in French-language dialogue exercises. Teacher2's actual Level of Use was 1 (Orientation). She encountered both First- and Second-Order Barriers that halted her progress through the Stages of Concern, and Levels of Use. The impact of Barriers is discussed below, in the context of the next Research Question of this project.

What Types of Barriers Were Encountered During Integration? What were the Teachers' attitudes toward barriers and how did they change from pre-implementation to post-implementation?

With the adoption of any new idea, individuals will meet with barriers that they must overcome in order to achieve successful implementation. The same holds true for integrating new technologies into a classroom and school environment (Ertmer et al., 2012; Ertmer, 1999; Hew & Brush, 2007). This section looks at the effects of barriers, first by exploring the case study teachers, and then generalizing with reference to the surveys and literature.

Teacher2 Barriers. The barriers that Teacher2 encountered prevented her from using the iPads in her classroom. In her initial survey, she indicated that she planned to use iPads 1-4 times before the end of the year. She planned to find some French games and apps that she could use with her students, particularly the 14-student class she teaches where every student has been identified as having behaviour issues. She also considered using the iPads to film dialogues and skits with students. The barriers she identified pre-implementation were: a lack of knowledge on how to use the iPads, the lack of French apps relevant to middle school French, and being scared of the technology and delicate nature of the devices. She attempted to overcome these barriers by using her partner's iPad to look for relevant apps. She notes finding one app that "looked good,"

but ultimately was not appropriate for assessing student progress. To feel comfortable using the iPads, this teacher suggested that she would have benefitted from training and practice on the iPads, having school rules established for use, and assistance in purchasing Apps, and signing out the iPads. She would also have benefitted from participating in professional development on iPad setup and apps for use in the classroom, exposure to different classroom management practices, examples of how other schools have used iPads, and examples of connecting apps with the curriculum. With respect to training, she suggested that the examples of using iPads be small, not large-scale projects.

The post-implementation barriers facing Teacher2, a technology-focused teacher who did not use the iPads, are of particular interest. In the follow up survey, Teacher2 attributed not using iPads to a lack of knowledge and training, lack of availability, fear of damage by the behavioural class and lack of apps for French. She further comments on wanting administration to provide her with training with more small group instruction. This teacher also encountered barriers with the iPads when trying to use the "Zondle" game because the game required Flash, which the iPads do not support. Two other teachers identified the lack of Flash as a barrier in their surveys.

The barriers that Teacher2 identified suggest that there is a great deal of overlap between First- and Second-Order Barriers. For example, Teacher2's concerns about a lack of knowledge/training imply both First-Order and Second-Order problems. Not having access to training is essentially a First-Order Barrier, whether because of a lack of time, money for training, or qualified individuals to provide training; however, in light of Teacher2's generally high level of skill with technology and profound integration of other

technologies in her teaching suggest that she may have been capable of using the iPad effectively without training. The survey results support this, as none or very few of the other teachers at the school had training, and yet many were able to use iPads effectively. This reflects Healy's (1998) statement that "If the computer can accomplish the task better than other materials or experiences, we will use it. If it doesn't clearly do the job better, we will save the money and use methods that have already proven their worth" (Healy, 1998, p. 218). Time to explore new technologies can be challenging to find, and Teacher2's comfort and proficiency with other technologies may have been a *barrier*, not an asset, to using iPads. This case study supports the call for more research on the interaction between the two types of barriers, which was called for in studies by Hew and Brush (2007).

One barrier that Teacher1, Teacher2, and most other teachers noted in both surveys was the lack of time they had with the iPads. This was reasonable, given that there were only 15 iPads for a school of approximately 750 students. In particular, the case study teachers, both of whom are rotary teachers, mentioned feeling apprehensive about having the iPads for a long period of time, and that they felt they were monopolizing them. This school operates on a 6-day cycle, and rotary teachers see students either two or three periods per cycle. To complete a two- to three-period lesson with all of the classes they teach, rotary teachers would have to sign out the iPads for 6 full days. For these teachers, using the iPads meaningfully could very well mean monopolizing them.

What steps can be taken to improve the integration of iPads at this school and others? This research question is directed at developing a best practices guide for implementing iPads to reach the innovation level.

Next Steps for This Middle School. As suggested in both surveys and both case studies, teachers want to be shown how others use iPads in specific program areas. This connects to research by Hughes (2005) who suggests that "the more content-specific the example, the more likely the teacher will see value and learn it" (Hughes, 2005, p.295). The teachers at this school throughout the duration of this project expressed the need to see concrete examples of how to use iPads in their classroom and in fact, on their own initiative, have sought it out. Some teachers noted using their planning time to observe other teachers' lessons using the iPads in hopes that they can use these ideas in their own teaching practices. Others have looked to online sources for ideas and inspiration. This calls for the administration at this school to provide more Professional Development that is more directly connected to iPad use and is subject specific. Beyond subject specific content, training would be useful to harness the full capabilities of the iPad like the video capabilities and apps that are not subject specific.

In relation to this idea, another frequent theme that was addressed by teachers is the lack of resources, specifically the limited number of iPads. Some teachers felt that there should be more iPads available in the school, while others wanted to see iPads used on a one-to-one ratio. Eichenlaub et al. (2011) in their study of iPads with university students learned that users needed to "personalize their experiences to really engage with the software and embed the devices into their studies, which the initial configuration would not allow" (Eichenlaub et al., 2011). In contrast, Bennett (2012), suggests that big results

can be achieved with a few iPads but innovative thinking in terms of instructional design were required but the results provided excellent opportunities for differentiated instruction. She provides limited ways in which to do this, but by the end of the school year, some teachers had started to think of the iPads in such a way and were even going beyond Bennett's suggestions and using them in more collaborative ways. An example of this would be using the video capabilities and iMovie to create drama skits and group book reports. This suggests that the school as a whole, should be aiming towards working at a Level 5 Stage of Concern and Level 5 Level of Use whereby the teachers collaborate with colleagues to improve iPad use in the classroom.

Another gap that still exists is in the area of assessment. Many teachers planned on devoting more thinking about this, and hoped to work with colleagues to create useful ways to assess students.

One way to address these needs would be to have a dedicated session for Professional Development on the iPads both where the Internet Technology Resource Teacher can demonstrate to staff some simple lessons on the iPad and do some group discussions on lesson ideas and things that have worked. Another suggested tool that would be useful is an online resource or cloud sharing area where we can post lessons and share ideas. If there are not resources available for more iPads, then the alternative would be sufficient training so that the teachers are well equipped to design lessons that would take advantages of the iPad capabilities.

In looking at how this school can grow from here, it would be helpful for teachers to have a place, whether a physical location or an Internet-based area, where they could share how they have used the iPad, as well as what has worked well, and some ideas for

assessment. Perhaps this feature could be added to the teachers' main login page from their computers so that it would be easy to locate and access.

One tool that may help to facilitate all of the suggested next steps for this middle school would be to have a technology plan for the school. This should be based on Peel District School Board's Technology initiatives and should outline how this particular school will use technology. The document should be written in student appropriate language so that both students, teachers and parents can understand what the goals of the technology, iPads specifically, are as well as what constitutes appropriate use. It should be reviewed with all teachers and students and include a letter of information to go home to parents for both parents and students, with a written technology agreement, to be signed by students and parents, insuring that the established rules of use will be followed and if not, the consequences will be made clear. This should be done in the opening week practices each school year.

Strategies for Overcoming Barriers. Hew and Brush (2007) offer strategies to overcome the First- and Second-Order Barriers identified in Ertmer et al. (1999). The strategies they suggest for overcoming First-Order Barrers are: creating a shared vision and technology integration plan, obtaining the necessary resources, and having alternative modes of assessment. The strategies they offer for overcoming Second-Order Barriers facilitating attitude changes and facilitating teacher knowledge and skills. The following applies some of these strategies to iPad implementation at this school, based on the literature and the results of the surveys and case studies.

1. Administrators should review and understand their school board's technology policies and from here, and outline their own school's technology plan for the

current year. This will include how many iPads are to be purchased, what other equipment is needed (iPad Cart, wireless Internet hub, cables, MacBook Pro, printer, etc.), as well as establishing a budget for purchasing apps and a plan for how these funds are to be allocated (by department, by teacher, by grade level, etc.). The technology plan must acknowledge that neither resources or teachers attitudes alone determine the successful integration of a new technology. Both have to be addressed. The importance of beliefs cannot be underestimated and it would be unwise to underestimate the importance of time, resources and training, either in their own terms or as they impact teacher attitudes.

2. School Boards and Administrators should provide professional development and training to teachers before iPads are available for use. At minimum, this training should provide the basics, such as how to turn on the devices, access apps, load apps, deal with security issues, use the iPad charging carts, load apps to all computers from a MacBook Pro, and save data to a MacBook Pro. Subsequent content-specific training, subject-specific training, and training with adapting lessons to the fundamentals of the iPads should be provided after preliminary use has occurred.
3. After preliminary attempts in using the iPads, teachers should convene and reflect on their experiences and share these reflections. Attitude changes may happen through discussion and reflection. Teachers should share lessons, ideas and experiences they have had using the iPads, and the results of these processes, whether positive or negative, should be used to develop a larger knowledge base that all educators can draw from. To this end, both individual schools and the

board as a whole should establish online and/or physical environments where teachers can collaborate with one another and with administration. At the board and school level, teachers can discuss successes and failures, which apps they are familiar with, new apps, lesson ideas, and how things are done at different schools. At the school level, the online environment should also provide an area where teachers can request apps to purchase and administration can approve or deny based on their funding.

4. Schools should establish school rules for using iPads and hold a school-wide assembly, followed by the presentation of a written Technology and iPad Plan. Schools should create a written agreement to be signed by students and parents that outlines the appropriate use of technology, and the consequences if they are misused.
5. Administrators should establish a fair schedule for iPad use so that all teachers, including rotary teachers, get ample time with the iPads. This may mean modifying the schedule for a few cycles to arrange for back-to-back periods with the iPads for each class. Rules have to be put in place for signing out the iPads and modifying class schedules.

Conclusions

One major finding of this project is that the enthusiasm for the iPad expressed in the literature was experienced by the staff at this school. The data collected in this project and the literature both suggest that the iPad has inherent benefits for differentiated learning and student engagement, particularly for students with learning disabilities and other high needs. The case study of Teacher1 suggests that even reluctant teachers can adapt to iPad use very quickly with encouragement from teachers and seeing the success and engagement of their students. Teacher2's attitude showed that there are teachers who are not using the technology, but who are open to it and believe in fundamental technology integration. They may be only a few barriers away from integrating new technologies. This study was completed over six months, and during this time, the teachers at this school went from relatively low Levels of Use and Stages of Concern, to the higher end of both areas. This indicates that even if the teachers continue on the self-directed trajectory that they are on, within the next school year, and with the right supports, the school should be able to have a program where iPads are integrated more widely. Although further resources or efforts to change teacher beliefs may be necessary, the resources and teachers that are already in place have been sufficient to show rapid improvement.

Areas for Further Study

Further studies are needed in a number of areas, including:

1. The benefits and drawbacks of using novel technologies, such as iPads. Currently, iPads are an exciting piece of technology because they are new,

and "cool" for the students. More studies are needed with respect to the impact of novelty on student engagement with technology.

2. The effect of using tablet computers, or iPads specifically, on students without learning disabilities. Much of the current literature on iPads is about students with learning disabilities and how the technology can facilitate their learning. Further research is needed with respect to iPad use in general classrooms.
3. How teachers change their methods of assessment when using new technologies.
4. Comparative research looking at different types of devices. More research is needed into new and emerging technologies, Smartphones in particular, to help professionals and parents understand what would be worth the investment for their students.
5. The interrelatedness between First- and Second-Order Barriers, and the strategies for overcoming them.

Limitations of this Study

The recognized limitations of this study include the small sample population, and the fact that all teachers participating in the program were from the same school. The surveys and interview questions were distributed only to teachers at one school and would require distribution in other schools to ensure reliability. The results obtained are unable to be generalized, though they do supplement the literature, and may be generalized to the school that was studied. The teachers' survey results are self-reported, which may or may not be as accurate as classroom observations. Also, the teachers'

participation in the study was self-selected, which could have skewed the results towards favouring the iPads. Finally, this study could have been improved by incorporating the student and administration's perspectives. In this study, as well as most of the body of literature that exists on iPads, very little of the student voice or administrator voice is present. Although administration supported this study, it would have benefitted from their perspectives.

Next Steps/Best Practices

One major goal in using iPads is how to assist teachers in fundamentally changing the way they think and teach. This process requires time, reflection, support and exposure to new ways of thinking. Innovative teachers will consistently revisit their thinking and challenge themselves to use technology in new ways, and as such, the framework designed for this study acknowledges that teachers' Levels of Use, Stages of Concern, and Barriers are ever changing. As new innovations are created, teachers must seek out new and better ways to adapt to the technology that is available. To meet those ever-shifting needs, and to assist with the fundamental integration of iPads, six innovation components are presented below:

1. Administration, with the help of staff, should develop a comprehensive school-wide technology plan that includes how funds are allocated for hardware, equipment, apps and training. To develop this plan, administration will have to collaborate with teachers so that the financial plan can be tailored to how the iPads are used and how they could be used if and when more resources are available. Any school considering the purchase of iPads must

plan for there to be a place to sync information, such as a MacBook Pro, and a place to store and charge the devices, such as an iPad cart.

2. iPad-specific training should be available before and after the iPads themselves become available. This could help teachers overcome their lack of confidence and lack of familiarity with the devices. Further training should include content-specific or subject-specific examples of how to use the iPads; however, to fully encourage fundamental integration, this training should be complemented by or followed by training on the iPad's higher-level uses, and how those more general functions – from the touch screen to the internal accelerometer – can be used in creative lesson-design. Nearly all teachers who used the iPads engaged with self-training and self-exploration of the devices, but the also identified that a lack of time with the iPads was a barrier. If it is not possible to purchase more iPads, then a schedule should be established that is fair and equitable for those teachers who would like the time to use the iPads, including during planning time, after school, and during the summer.
3. Communication and collaboration among teachers is essential after their preliminary use of the iPads. Staff should convene and reflect in person, in groups, with the goal of sharing what works, what doesn't, and what is missing when it comes to implementing the new technology.
4. To further facilitate teachers collaborating and communicating, the administration of a school, if not the school board itself, should create an online environment where all staff members can collaborate and share ideas, lessons, successes, and failures, and reflect with one another to work towards

a more fully integrated iPad program. This space could also provide a venue for teachers to communicate with each other and administrators about Apps that work, and Apps that they want to try.

5. School-wide rules should be established for the effective use of iPads. Students and parents should sign written agreements to ensure appropriate use. Consequences must be clear if the rules are not followed.
6. The school must establish a fair schedule amongst the staff for iPad use, including rotary teachers, and establish consistent sign out procedures for the iPads. The specific challenges posed to rotary teachers around scheduling and not wanting to monopolize the devices could be addressed by:
    a. administrators supporting the reorganization of timetables for rotary classes such that when the iPads are needed, students can be with their rotary teachers in back-to-back periods;
    b. the school can designate future purchases of devices to be allocated to the rotary subjects only, and/or;
    c. teachers and administrators could encourage differentiated and cross-disciplinary assignments between rotary classes, such as French or Music, with core subjects, all of which could use the iPads.

Although the data gathered for this project suggests that teacher-directed iPad implementation can be successful and show very fast results, the six innovation components above would likely create a more fundamental, consistent, and widespread integration of iPads at the school that was studied. These components may also help this school, which is already enthusiastic about technology implementation, become a

replicable model for iPad implementation for other schools across the Peel District School Board, and beyond.

Appendices

APPENDIX 1: Pre-Implementation of iPads in the Classroom Survey

Pre-Implementation of iPads in the Classroom

Current Teaching Package

Answering this question could affect the anonymity of this survey therefore it is not required but would be appreciated.

1. 1. What subjects do you currently teach? (Please select all that apply)

- ☐ Language Arts
- ☐ Mathematics
- ☐ Science and Technology
- ☐ French
- ☐ Music
- ☐ Visual Art
- ☐ Drama
- ☐ Dance
- ☐ Physical Education
- ☐ Character Education
- ☐ Special Education

Other (please specify)

Pre-Implementation of iPads in the Classroom

Technology in the Classroom

***2. What technologies are you currently using in your classroom? (Please select all that apply and add any additional technologies not listed under 'other')**

- ☐ Document Camera
- ☐ Projector
- ☐ Computer(s)
- ☐ Smartphones
- ☐ iPods
- ☐ iPads
- ☐ Mobi's
- ☐ Mobi and Clickers
- ☐ Word Documents
- ☐ Excel Spreadsheets
- ☐ Wikis
- ☐ My Class Site
- ☐ Internet
- ☐ Desire to Learn (D2L)
- ☐ YouTube
- ☐ DVDs/Videos
- ☐ Other Online Videos (not including YouTube)
- ☐ Nintendo Wii
- ☐ XBox 360
- ☐ Playstation 3
- ☐ CD Player with CDs
- ☐ Stereo/Radio
- ☐ DVD Player with DVDs

Other (please list all other forms of technology used)

Pre-Implementation of iPads in the Classroom

iPads in the Classroom

The following questions will be related to the implementation of iPads in your classroom. Please answer all questions to the best of your ability and include all other possibilities in the other section where applicable.

***3. How often do you plan on using iPads in your classroom?**

- Never
- Occasionally (1-4 times before the end of the year)
- Often (4-8 times before the end of the year)
- Weekly
- Daily

Other (please specify)

Pre-Implementation of iPads in the Classroom

I Do Not Plan On Using iPads in My Classroom

***4. Why do you plan on NOT using iPads in your classroom?**

***5. What would it take to have you use iPads in your classroom? (i.e. what type of training, administration support etc.)**

Pre-Implementation of iPads in the Classroom

Planned Usage of iPads in the Classroom

The following questions are intended to gain an understanding on how you hope to use iPads in your classroom.

***6. What are you looking the most forward to with using iPads in the classroom?**

***7. How do you plan on using iPads in your classroom?**

***8. What apprehensions do you have about using iPads in your classroom?**

Pre-Implementation of iPads in the Classroom

Results and Pedagogical Changes

The purpose of this page is to understand what you foresee happening in the results of your students and your own pedagogy with the implementation of iPads in your classroom.

***9. What type of results do you expect to see when you use iPads in your classroom?**

***10. How do you think your pedagogy may change as a result of using iPads in your classroom?**

Pre-Implementation of iPads in the Classroom

Preparedness for the iPads

The following questions are intended to provide an understanding of how you have prepared yourself and your classroom for using iPads.

***11. What steps have you taken to prepare for using iPads in your classroom or what steps do you plan to take to use them?**

***12. What steps do you feel administration has taken to help prepare you and your classroom to use iPads?**

***13. What do you plan on doing to ensure safe usage of iPads in your classroom? (i.e. to prevent cyberbullying, damage to equipment, web surfing, etc.)**

Pre-Implementation of iPads in the Classroom

***14. What would you like to see happen before the iPads are used in your classroom? (Select all that apply)**

- ☐ Training on iPads - general usage
- ☐ Practice using iPads
- ☐ School rules established
- ☐ Professional Development held in school on iPad set up
- ☐ Professional Development on apps for use in the classroom
- ☐ Established procedures for purchasing iPad apps
- ☐ Established procedures to sign out iPad cart
- ☐ Exposure to different classroom management practices with technology in the classroom
- ☐ Examples of how other schools have used iPads in their classrooms
- ☐ Connection of apps with curriculum

Other (please specify all other examples)

Pre-Implementation of iPads in the Classroom

Activities and Lesson Using the iPads

The purpose of this page is to gain an understanding of your attitudes towards using the iPads with respect to activities and lessons.

***15. What activities would you like to do with the iPad that you feel at this point you are not able to do and what is preventing you from doing these activities?**

***16. Do you plan on taking lessons that you have already taught and adapting them to the iPad? If so, how will you do this? If not, what tools are you going to use to develop new lesson/unit plans?**

Pre-Implementation of iPads in the Classroom

Anything else?

Please share anything else that you feel is relevant in implementing iPads in the classroom.

***17. Is there anything else that you would like to share with me with respect to using iPads in your classroom?**

APPENDIX 2: Post-Implementation of iPads in the classroom

Post Implementation of iPads in the Classroom

Let's Get Started!

Hi Everyone! I wanted to thank you in advance for completing my survey. I look forward to sharing my results with all of you in the new year. The more information that you are able to provide me now, the more information I will be able to share with you in the future.

You have a fabulous staff and I am glad that I was able to complete my research with your help. Thank you once again!
Cheers!
Lauren Wood

1. Have you used iPads since they were implemented at [redacted]e?

- Yes
- No

My Experience with iPads in the Classroom

This page is designed to gain an understanding of the general overall experience of iPads in the classroom.

***2. How have you used iPads in the classroom since they have been available at [redacted]e?**

***3. What benefits and disadvantages have you seen since using iPads in your classroom (or other classrooms)?**

***4. What has worked well and what difficulties have you encountered? Have you encountered any limitations and if so, what are they?**

Student Reactions to the iPads

This page is designed to gain an understanding of the impact that iPads have had on student learning in the classroom.

Post Implementation of iPads in the Classroom

***5. What reactions have your students had when given the opportunity to use iPads in their lessons?**

***6. What changes have happened with student performance in the classroom and what do you attribute these changes to?**

***7. Are there certain types of learners that are more engaged with iPads than other learners and if so, which types?**

Teacher and Classroom Focused Questions

This page is to gain a better understanding of the impact of iPads on the classroom and teaching methods.

***8. Which subjects, topics or strands have lent themselves more readily to creating lessons using the iPad and which have you struggled with and why?**

***9. How has your classroom changed since the introduction of iPads? (your teaching methods, overall structure and management of your classroom, etc.)**

***10. How have your pedagogical beliefs changed since the implementation of iPads at [redacted]?**

***11. How has your own thinking changed since having iPads in your classroom? (your teaching, personal use, student engagement, etc.)**

Post Implementation of iPads in the Classroom

Administration Support

***12. What steps do you feel the administration at [redacted] took to help prepare you to use iPads in the classroom and based on your experience, what suggestions would you make to other administrators wanting to implement iPads in their classrooms?**

Supports, Tools and Technology

This page is designed to gain an understanding of the supports, tools and technologies that you utilized or want to utilize in the future with respect to iPads.

***13. What types of supports have you taken advantage of while moving towards iPads in the classroom (i.e. professional learning, self-learning, peer support, online help, online lesson ideas, etc.)?**

***14. Are there any other tools or technologies that you wish you had available and if so what are they?**

Assessment and Parent Feedback

This page is designed to gain an understanding of assessment and parent feedback with respect to using the iPads in the classroom.

***15. What changes have you had to make with respect to assessment?**

16. Have you received feedback from parents, and if so, what has the feedback been?

Apps, iPads and the Future

Post Implementation of iPads in the Classroom

This page is designed to gain an understanding of the success (or failure) you had using the iPads and what your plans for the future may be.

***17. After this year's experience with using the iPads in the classroom, what do you hope to do with it in the future and what may you stay away from? (Will you use them again? How?)**

***18. What apps have you found useful in your teaching (provide names if possible) and what apps would you like to see created?**

***19. Was the technology or equipment misused and if so, how?**

Did not use iPads in the classroom

***20. Why did you decide not to use iPads in the classroom? Please list all reasons.**

***21. Is there anything that administration could have done that would have enabled you to use iPads in your classroom?**

***22. What advantages and/or disadvantages have you noticed with other classrooms using the iPads?**

Post Implementation of iPads in the Classroom

***23. Are you planning on using iPads next year and if so how?**

***24. Did your students ever request or mention using iPads in the classroom? In what respect?**

***25. To your knowledge, did any of your students use their own iPads in the classroom or at home for homework?**

Anything else?

First of all, thank you for completing my survey. I appreciate all of your responses to my questions and I look forward to sharing my findings with you in the new year.

This page is designed to give you an opportunity to share anything else that you would like.

Please contact me if you would like to do an interview with me. Thank you!

26. Is there anything else you wish to add?

APPENDIX 3: INTERVIEW QUESTIONS

USED:

1. Did you plan to use iPads in your classroom? If so, how? If not, what changed your mind?
2. Please discuss your experiences with technology in your classroom generally, and using iPads specifically.
3. How did using iPads differ from using other types of technology in your classroom?
4. Did you give or receive feedback to or from colleagues with respect to using iPads?
5. What did you feel was most successful about using the iPad?
6. What difficulties or limitations did you encounter when using the iPads?
7. What do you feel that administration did well in preparing you and supporting you with iPads?
8. What else do you think administration could have done to help you, if anything?
9. What do you think our next steps, as a school should be?
10. What advice would you give to another principal looking at adding iPads to their school program?
11. Is there anything that you wanted to share that was not covered in the surveys?

DID NOT USE:

1. Currently, how do you use technology in your classroom?
2. Did you plan on using iPads in your classroom?
3. What are your personal experiences with the iPad?
4. Why did you decide not to use iPads?
5. What barriers did you encounter?
6. What supports do you feel were there for you if you had decided to use iPads in your classroom?
7. What additional supports would you need to use iPads in your classroom?
8. What else could administration done to support you?
9. What do you think our schools next steps should be to more fully integrate iPads in our classrooms?
10. What advice would you give another principal wanting to implement iPads at their school?
11. At this point, do you think you will use iPads next year? If yes, how do you think you will use them? What are you going to do to overcome any barriers that you have?
12. What are the advantages and disadvantages of the iPads vs. other technologies that you use in your classroom (or that are available)?
13. Is there anything else that you would like to share?

APPENDIX 4: Classroom Apps

Here are some of our favorite educational apps:

Curriculum

Art/Music
Band
Le Louvre
Virtuoso Piano Free

Language Arts
SAT Vocab Challenge (free)
Spel it Rite (free)
Word Warp (free)

Math
ArithmeTick
Brainz
Cloud Math Free
Coin Flip
Coin Math (free)
iMaths
Kids Math
KidsMathFun
Mad Math Lite
Math Cards
Math Drills Lite
MathKingdom
Math Magic
Math Step123
Multiplication Genius
Number Line (free)
PopMath

Science
Molecules (free)
Star Walk

Social Studies
Constitution
Google Earth
Google Maps
Historical MapBlarij Lite (free)
Today in History Lite (free)

Special Education
Proloquo2Go
Wheels on the Bus

Productivity/Creativity

Adobe Ideas (free)
Adobe Photoshop ExpressDraw 4 Free
Colors! Lite
Comic Touch Lite
Corkulous
DoodleBuddy
Draw 4 Free
Filterstorm
Google Docs
iDoodle2 lite (free)
iThoughts
iWorks
Keynote
Kid Animation (free)
Magic Drawing Pad
Numbers
Pages
Photo Frames
Photogene
Puppet Pals (free)
Qvik Sketch
StoryKit (free)
Strip Designer

Reference

2Do Lite
3D Brain
aNotes
Art Lite (free)
BBC News
BrainPOP Featured Movie
Cool Facts (free)
Dictionary!
Dragon Dictation
EarthObserver (free)
ENG-LAT
Facts (free)
Google Earth
GoSkyWatch Planetarium History:Maps
National Gallery, London
National Geographic
NPR
On This Day
Planets
Presidents
Simplenote
Wikipanion
World Countries ALL-IN-ONE (free)

(Bennett, 2012) p. 24

APPENDIX 5: Consent Form

(TO BE ON UOIT LETTERHEAD)

LETTER OF INFORMATION – Teachers

Research Study: Teachers' Attitudes Towards the Implementation of iPads in the Middle School Classroom

I, Lauren Wood, am a teacher at TBA Middle School and a Masters Student at the Faculty of Education at the University of Ontario Institute of Technology (UOIT). With the approval of the UOIT Research Ethics Board, I am about to embark on a project designed to learn more about the implementation of new technology – iPads specifically – in the classroom. I am interested in particular in contributing to the existing research on how to capitalize on teacher and student enthusiasm for new technology, best practices on how to use technology effectively across different subject areas, and how to address teachers' concerns about the use of technology in the classroom. I anticipate using this research in the development of a research paper that will be published and made available to schools throughout the Peel Board, and hopefully beyond. Data results may also be published in journals and presented at conferences.

I am asking for your consent to participate in this study. Data will be collected using the following methods:

- An online survey will be administered before the iPads are introduced to the classroom to capture teachers' past experiences and current perspectives on implementing new technology into the classroom. A content analysis (Berg, 2004) of

teacher responses will be conducted to identify themes that emerge. The themes will be summarized and discussed with you before the project begins for further elaboration. This data will be used as a baseline for exploring how your thinking and views of implementing technology in the classroom may be impacted during and after the implementation.

- At your request, I will be available before, during, and after the implementation to troubleshoot questions and complications that arise during the implementation of the technology, and its subsequent use. With prior teachers' consent and where possible, I will observe the use of iPads in the classroom.
- At the end of the project, I will conduct another online survey, analyze the themes in the data again, and follow-up with an open-ended interview with you to discuss your reactions and experiences with the implementation, any practices you might suggest, and anything you may wish to share about whether your perspective shifted or not. With your permission and further consent, I will videotape these interviews for the purposes of presenting the results of this study.

A sample set of questions for the surveys is attached for your information.

If you agree to participate in the study, you may withdraw from the study at any time without penalty. If you choose to participate in the study, there is no penalty to withdraw from the study and any data that has been collected will be shredded or erased. There is no penalty for not participating. You can also choose not to answer specific questions. The information you provide will be anonymous and will be combined with the responses of the other teachers into a summary report. Any data

collected, will be stored securely under my supervision and will be destroyed after five years. The expected time commitment for all components is approximately 30 minutes per survey. I, along with my project supervisor, are the only individuals having knowledge that you have participated in this study and we will be the only individuals that will have access to your survey answers. None of these activities and decisions – participating, not participating, and withdrawing – will be shared with others. Please note that some survey answers may include identity-revealing information. If you wish to share your expressed views with the researchers, but do not want to be quoted, you may express this in the survey questions that you do not wish to share.

By participating in this research, you are provided with an opportunity to reflect on your teaching practice and how technology is integrated in to it. The results of this research will help increase our body of knowledge in establishing best practices when implementing new technology initiatives in the classroom. This research will help others in our staff become more confident in how to use these in the classroom and it will give our staff and opportunity to share ideas about how they use iPads in their classrooms. The potential risks for this study include feeling pressured to participate in the study.

Your signature on the consent form indicates that you have read this letter, understand its contents, and authorize your participation in this research project. By signing this consent form, you are not waiving your legal rights. If you have questions about this project, feel free to contact me or call my project supervisor, Dr. Janette Hughes, at (905) 409-9800. The UOIT Research Ethics and Compliance Officer, will also be available to provide answers to pertinent questions about the research participants'

rights (compliance@uoit.ca (905) 721-8668, ext. 3693). This research project has been reviewed by the Research Ethics Board at UOIT and can be identified as REB Application #11-083. Survey data will be housed on US servers and is subject to the Patriot Act. Thank you for considering participation in this research study.

Lauren Wood, M.Ed. Candidate, Faculty of Education, UOIT

CONSENT FORM : Teachers' Attitudes Towards the Implementation of iPads in the Middle School Classroom

I have read the Letter of Information relating to the above-titled project, I understand the proposed research and my questions have been answered to my satisfaction.

I understand that I have the right to withdraw from the study at any time and I understand that the information collected is for research purposes only.

(PLEASE CIRCLE YOUR LEVEL OF CONSENT)

a) I consent to participate in this research only through anonymous surveys.

b) I consent to participate in anonymous surveys and being videotaped during the follow-up interview. I also acknowledge that certain parts of my interview may be used in the presentation of the paper.

c) I consent to participate in an anonymous survey and in a follow up interview but decline to be videotaped and wish for my answers to be aggregated with those of the other participants.

d) I **do not** consent to participate in this project.

Name (please print): _____

Signature: _____

Date: _____

Appendix 6: List of Apps Used by Teachers at this Middle School

Audience
Basic Fraction
Bookabi
BrainPOP
Calendar
CBC Music
CBC News
Clibe
CNN
Comic Life (not an app)
Crayola Studio HD
Dropbox
eClicker
EdModo
Extras for iMovie
Facetime
Flash Cards
Garage Band
Glow Draw!
Google
Google Earth
iBooks
Idea Flight (good tool for collaboration)
Idea Sketch
iMovie
iThoughts for Mind Mapping
iTunes U
Keynote
Khan Academy
Math Bingo
MathBoard
Merriam-Webster Dictionary
National Geographic World Atlas
NFB Pix Stop
Notability
Pages
PDF reader (for annotation)
Photobooth
Picture Card Maker
ScreenChomp
SimpleMind
Teacher Pal
TED
Translate

TVO Doc Studio
Wattpad
WhirlyWord HD

Apps Desired by Teachers

Middle school math apps (incl. geometry and data management)
Middle school French apps

Appendix 7: Case Study Survey Transcripts

Teacher1: PRE-IMPLEMENTATION SURVEY

Q1: What subjects do you currently teach? (Please select all that apply)

- Music

Q2: What technologies are you currently using in your classroom? (Please select all that apply and add any additional technologies not listed under 'other')

- Document Camera
- Projector
- Computer(s)
- iPods
- Word Documents
- Internet
- YouTube
- DVDs/Videos
- CD Player with CDs
- Stereo/Radio
- DVD Player with DVDs

Q3: How often do you plan on using iPads in your classroom?

Never

Q4: Why do you plan on NOT using iPads in your classroom?

PRogram already in place. No time between now and end of year. Maybe another year...

Q5: What would it take to have you use iPads in your classroom? (i.e. what type of training, administration support etc.)

More classtime with students.

Q6 to Q16

Skipped

Q17: Is there anything else that you would like to share with me with respect to using iPads in your classroom?

NO.

Teacher1 Post-Implementation Survey

Q1: Have you used iPads since they were implemented at [SCHOOL]?

Yes

Q2: How have you used iPads in the classroom since they have been available at [SCHOOL]?

Garage Band - creating various songs, beats, etc. using different instruments.

Q3: What benefits and disadvantages have you seen since using iPads in your classroom (or other classrooms)?

-Students had the freedom to create a masterpiece. Program was user friendly for their age group. -Disadvantage: not enough of them so they could each have one!

Q4: What has worked well and what difficulties have you encountered? Have you encountered any limitations and if so, what are they?

Limitations - 1 per 2 students in the class.

Q5: What reactions have your students had when given the opportunity to use iPads in their lessons?

-LOVED IT! Were very excited and enthusiastic. Stayed on task!

Q6: What changes have happened with student performance in the classroom and what do you attribute these changes to?

-Use of the Ipad in the classroom did not have any impact on changes in my class.

Q7: Are there certain types of learners that are more engaged with iPads than other learners and if so, which types?

-I found the boys more excited to use the program than the girls, but only by a slight margin.

Q8: Which subjects, topics or strands have lent themselves more readily to creating lessons using the iPad and which have you struggled with and why?

-Music - composition.

Q9: How has your classroom changed since the introduction of iPads? (your teaching methods, overall structure and management of your classroom, etc.)

-Definitely using them again! Kids were completely engaged; couldn't wait to show each other their compositions; they taught me a few new things about the program! It was great.

Q10: How have your pedagogical beliefs changed since the implementation of iPads at [SCHOOL]?

-I'm definitely going to implement the use of the Ipads again for composition purposes.

Q11: How has your own thinking changed since having iPads in your classroom? (your teaching, personal use, student engagement, etc.)

It's opened me up to a whole new world, esp. as far as composition is concerned!

Q12: What steps do you feel the administration at [SCHOOL] took to help prepare you to use iPads in the classroom and based on your experience, what suggestions would you make to other administrators wanting to implement iPads in their classrooms?

-I learned how to operate the Ipads, cart, code to get into them, etc. through another teacher who had been using them quite frequently. -A booklet/guide would be helpful.

Q13: What types of supports have you taken advantage of while moving towards iPads in the classroom (i.e. professional learning, self-learning, peer support, online help, online lesson ideas, etc.)?

-Not much. Would do more professional learning prior to using them again. -My lesson with the students was based on self-learning.

Q14: Are there any other tools or technologies that you wish you had available and if so what are they?

n/a

Q15: What changes have you had to make with respect to assessment?

-Non, but will have to create a rubric, form of assessment, etc. for the next time they work with the Ipads.

Q16: Have you received feedback from parents, and if so, what has the feedback been?

n/a

Q17: After this year's experience with using the iPads in the classroom, what do you hope to do with it in the future and what may you stay away from? (Will you use them again? How?)

-I will use them again. -The time spent on them will be more structured, and more geared towards an assessment of some sort.

Q18: What apps have you found useful in your teaching (provide names if possible) and what apps would you like to see created?

-Garage Band

Q19: Was the technology or equipment misused and if so, how?

Surprisingly not!

Q20 – Q25

Skipped

Q26: Is there anything else you wish to add?

Respondent skipped this question

Teacher2: Pre-Implementation Survey

Q1: 1. What subjects do you currently teach? (Please select all that apply)

- French
- Drama
- Dance

PAGE 2: Technology in the Classroom
Q2: What technologies are you currently using in your classroom? (Please select all that apply and add any additional technologies not listed under 'other')

- Document Camera
- Projector
- Computer(s)
- Mobi's
- Word Documents
- My Class Site
- Internet
- YouTube
- DVDs/Videos
- Other Online Videos (not including YouTube)

Q3: How often do you plan on using iPads in your classroom?

Occasionally (1-4 times before the end of the year)

Q4 – Q5

Skipped
Q6: What are you looking the most forward to with using iPads in the classroom?

I am looking forward to learning how to use them, along with the students!

Q7: How do you plan on using iPads in your classroom?

I hope to use the iPads to play French games and apps, particularly with my intenstive behavioural class. I could possibly use iMovie to film dialogues and skits with students as well.

Q8: What apprehensions do you have about using iPads in your classroom?

My apprehensions surround a lack of knowledge on how to use the iPads, in addition to the lack of French applications that are relevant to middle school level French. I am also concerned that I am clumsy, and will break one!

Q9: What type of results do you expect to see when you use iPads in your classroom?

I hope to see students engaged in their learning, and to be able to show me new and improved ways of doing things.

Q10: How do you think your pedagogy may change as a result of using iPads in your classroom?

I think my instruction could become more student driven rather than teacher driven. Perhaps having students create lessons using the iPads will make me give up a bit of control...haha...

Q11: What steps have you taken to prepare for using iPads in your classroom or what steps do you plan to take to use them?

I honestly haven't taken many steps thus far. I have attempted to find good apps using my partner's iPad, however I am still a little afraid of the technology.

Q12: What steps do you feel administration has taken to help prepare you and your classroom to use iPads?

Our administration has provided the school with a set of iPads, however there has been limited training.

Q13: What do you plan on doing to ensure safe usage of iPads in your classroom? (i.e. to prevent cyberbullying, damage to equipment, web surfing, etc.)

I think just discussing how we use the iPads with the students, and co-creating criteria of safe/effective use of the technology would be a step in ensuring limited damage or cyberbullying. Monitoring their progress and anecdotally taking notes (perhaps with an iPad??) can help as well.

Q14: What would you like to see happen before the iPads are used in your classroom? (Select all that apply)

- Training on iPads - general usage
- Practice using iPads
- School rules established
- Professional Development held in school on iPad set up
- Professional Development on apps for use in the classroom
- Established procedures for purchasing iPad apps
- Established procedures to sign out iPad cart
- Exposure to different classroom management practices with technology in the classroom
- Examples of how other schools have used iPads in their classrooms
- Connection of apps with curriculum

Q15: What activities would you like to do with the iPad that you feel at this point you are not able to do and what is preventing you from doing these activities?

As mentioned before, there are little to no iPad apps that are tailored to a middle school core French program. I would like to see more apps developed. I have found one app that looks great, but the multi-user set up does not allow for logging in and out, so it would be difficult to assess student progress.

Q16: Do you plan on taking lessons that you have already taught and adapting them to the iPad? If so, how will you do this? If not, what tools are you going to use to develop new lesson/unit plans?

I probably could, if I had more time to play with the iPads. Time is also another limiting factor. I have had success with the MOBI software in my instruction, as well as creating videos for youtube.I used to use a lot of powerpoints, I wonder if I could use the iPad to enhance those.

Q17: Is there anything else that you would like to share with me with respect to using iPads in your classroom?

I think for the iPads to be used effectively by all teachers, the school should look at more training, and show teachers how to do things that are not overwhelming (e.g. not showing

us how to do a movie project, but something smaller, more achievable with a limited amount of time). We all need baby steps when it comes to using new technology. Perhaps once we are trained to do the really simple stuff, we will feel more comfortable and branch out to more exciting, complicated features of the iPad?

Teacher2 Post-Implementation Survey

Q1: Have you used iPads since they were implemented at [SCHOOL]?

No

Q2 – Q19

Skipped

Q20: Why did you decide not to use iPads in the classroom? Please list all reasons.

Lack of knowledge/training Lack of availability (clearly other people were using them!) Fear of damage by behavioural intensive classes Lack of apps for French

Q21: Is there anything that administration could have done that would have enabled you to use iPads in your classroom?

Formal training or lunch and learns to even learn simple ways to use it. We have had some demonstrated at staff meetings, but smaller group instruction is needed

Q22: What advantages and/or disadvantages have you noticed with other classrooms using the iPads?

Things get broken, but kids really like using them and have a really good handle on them

Q23: Are you planning on using iPads next year and if so how?

Probably not, due to the fact that I teach Core French and have 10 classes. It wouldn't be reasonable for me to sign them out so much. Also, unless Ihave more training, I will be inept! I am considering purchasing one to play with over the summer if I am able to afford it.

Q24: Did your students ever request or mention using iPads in the classroom? In what respect?

Nope

Q25: To your knowledge, did any of your students use their own iPads in the classroom or at home for homework?

Not that I know of, at least for French

Q26: Is there anything else you wish to add?

Nope, just that this is a good project and I think your research is important! Good luck with your study!

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