INTERACTIVE WHITEBOARD TECHNOLOGY:

PERSPECTIVES AND ATTITUDES OF FSL TEACHERS

by

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ABSTRACT

Advancements in the use of technology in education are changing the way students learn and inevitably change the way teachers teach. This project explores French as a Second Language (FSL) teachers' perceptions and attitudes towards interactive whiteboard technology (IWT) use by quantitative and qualitative methods. This study also reviews the literature on technology for second language learning and teaching, second language teaching methods, information communication technology (ICT) use in second language classrooms, IWT and the TAM.

To this end, this project cites the technology acceptance model (TAM) and implements a modified version of this model to support the data collection for this research. The data were collected from FSL teachers of two Eastern Ontario school boards and the study consisted of an analysis and discussion of both questionnaire and interview responses. In the interpretation of the findings, the entire analysis from both quantitative and qualitative data was taken into account.

In general, the results of the study support the following conclusions: 1) FSL teachers perceived IWT use as a way to enrich FSL instruction; 2) FSL teachers perceived IWT use as a way to enrich FSL learning; 3) FSL teachers perceived IWT easy to use if the necessary training was given on how to use IWT to its optimal potential; 4) FSL teachers had mixed attitudes towards the push for technology use in the FSL classroom. Additional findings, implications for future research and limitations to the study are also discussed.

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CHAPTER 1

INTRODUCTION

Rationale

As both a FSL teacher and student, I have witnessed numerous successful technological innovations that have changed the way I have learned FSL and influenced the way I now teach FSL students. The success of technology usage for language learning is primarily due to its potential to integrate various types of media (such as sounds, video, graphics, and text.) and deliver such media in various forms (by way of collaborative, interactive, and simulative activities). These advancements in technology are changing the way students learn and inevitably change the way FSL teachers teach them.

Over 25 years ago, Lindenau (1984) argued that "we are all in the midst of a microelectronic revolution," and pointed out that ignoring the arrival of such revolutions carries negative effects: "A blackboard-and-textbook system of education in the age of microelectronics will inevitably promote detrimental and far-reaching consequences" (p.119). Other researchers have argued that there could be a potential waste of resources if teaching practices do not take advantage of new technological tools (Dunkel, 1987). Undeniably, several multimedia tools have been successfully incorporated in the FSL classroom, for example audio voice recording devices, videotapes, computers, and the use of the internet to increase authentic communication and interaction among L2 learners. Most recently interactive whiteboard technology is being introduced to second language teachers for use in second language classrooms – though its use remains uncommon in FSL programming.

So, why then investigate IWT? Using IWT is a way to interact with digital content and multimedia in a multi-person learning environment. SMART™ Technologies, an Alberta-based manufacturer of SMARTboards™ (an interactive whiteboard) is currently being used by 18 million students in more than 600,000 classrooms in more than 100 countries around the world (SMART Technologies, 2010). Learning activities with an interactive whiteboard may include, but are not limited to the following: showcasing student presentations, creating digital lesson activities with templates, images and multimedia, viewing websites as a group, manipulating text and images, making and saving notes for later review by using e-mail, the internet or print, and using presentation tools that are included with the whiteboard software to enhance learning materials (SMART Technologies, 2010). These are also elements that help teachers to create lessons that interest and engage students during the learning process. Moreover, educators can use IWT while maintaining dynamic interaction with the entire class, provide computer-based learning without isolating students and encourage a higher level of student interaction in both teacher-directed and group-based exchanges. This type of student participation leads to an increased state of engagement as well as enhances the students' learning environment (Bryant & Hunton, 2000).

Student engagement is critical to student motivation during the language learning process in a FSL classroom. The more students are motivated to learn, the more likely it is that they will be successful in their efforts. Numerous factors influence student motivation, including effective use of technology. In Ontario's classrooms there are new technologies being used to encourage students, educators and parents to explore

resources, work and study effectively and communicate collaboratively. In April 2009, the Ontario Public School Boards' Association (OPSBA) released a Discussion Paper entitled: *What If? Technology in the 21st Century Classroom* based on input from 25 Ontario School Boards and District School Authorities. The OPSBA (2009) explores the relationship between the use of technology and its scope for increasing the quality of teaching and learning. OPSBA president, Colleen Schenk comments on this publication saying, "Today's students are leaders in the use of technology and we know they want their learning experiences in school to reflect this. Students want to take the technology they use in their daily lives and integrate it with how they learn. They want their learning clearly connected to the world beyond the school" (OPSBA, 2009). But what about the teacher? How is the role of the teacher evolving? When it comes to ease with technology, the hierarchy in the classroom is inverted, "students are more proficient and comfortable in the digital environment than the teacher" (OPSBA, 2009). This change in classroom dynamics creates a setting where the level of engagement is high and the environment is rich with student-to-student learning dynamics. But how does a teacher come to use technology in the classroom?

There are many factors that influence the use of a tool and its success in a language learning environment such as its design, as well as its implementation and integration by the teacher. Crook (1994) observed that unfortunately teachers tend to assimilate the use of new technologies to their pre-established teaching styles and stated that "this inertia is unfortunate in that it reflects a failure to seize new opportunities" (p.13). In addition, Lindenau (1984), quoting other education researchers, underlined the

importance of identifying viable educational uses of technology, such as the television, in saying "This instrument can teach, it can illuminate, yes, can even inspire. But, it can do so only to the extent that humans are determined to use it to those ends. Otherwise, it is merely lights and wires in a box" (p. 121).

Concerns like these have led me to echo the question asked by Davis (1989), what causes people to accept or reject information technology? Davis (1989) explains that "people tend to use or not use an application to the extent they believe it will help them perform their job better" and adds that "even if potential users believe that a given application is useful, they may, at the same time, believe that the system's too hard to use and that the performance benefits of usage are outweighed by the effort of using the application" (p.320). It is with this explanation that Davis (1989) defines *perceived usefulness* (PU) and *perceived ease of use* (PEU). In this proposed research, PEU refers to the degree to which an individual FSL teacher believes that using IWT would require minimal cognitive effort, whereas PU is defined as the degree to which an individual FSL teacher believes that using IWT would enhance his or her teaching performance in the FSL classroom. These perceptions inadvertently shape the user's attitudes towards IWT use.

Purpose of the Study

The purpose of this study was to explore French as Second Language (FSL) teachers' perceived usefulness (PU), perceived ease of use (PEU), the external factors that shape these perceptions and their attitudes towards Interactive Whiteboard Technology (IWT) use by applying the TAM (Technology Acceptance Model) (modified and adopted from

Davis, 1989) framework. To summarize the rationale written above, four research

questions guided this study:

1. How do FSL teachers perceive IWT usefulness?

2. How do FSL teachers perceive the ease of IWT use?

3. What are the attitudes that influence how FSL teachers' perceive IWT usefulness as well as how they perceive the ease of IWT use?

4. What external factors do FSL teachers identify as influential towards how they perceive IWT usefulness as well as how they perceive the ease of IWT use?

These questions were explored through a mixed methods study. This study was

conducted because it is my belief that it would help fill the existing literature gap between

FSL research, TAM research and IWT research. Despite their interconnectivity, seldom

have questions in these three areas been addressed in relation to one another in previous

research.

Defining Key Terms

It can be assumed that throughout this paper the terminology used relates to FSL

teaching and learning in Ontario, as well as IWT use in a traditional classroom setting.

This section will introduce and define the following terms used in this study: Interactive

Whiteboard Technology, French as a Second Language Program, Davis' Technology

Acceptance Model and the modified version of TAM used in this study.

Interactive Whiteboard Technology

Interactive Whiteboard Technology (IWT) is a touch-sensitive electronic presentation device (see Figure 1). It comprises four components: a computer, a projector, appropriate software and the display board. The computer images are displayed on the whiteboard by the digital projector and all applications on the computer can be controlled via touching the board, either with your finger or with an electronic pen (see Figure 2). In addition to that, the touch-sensitive screen captures everything written or drawn on its surface in real-time. All annotations can be saved to and printed from your computer. There are many brands of interactive whiteboard such as SMARTboard™, Promethean™, and others (Cutrim Schmid, 2008).
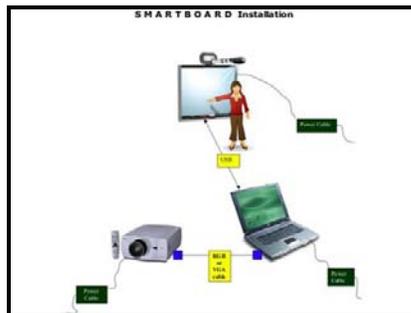
Figure 1 Interactive Whiteboard Connection   Source: Powerful Learning Practice
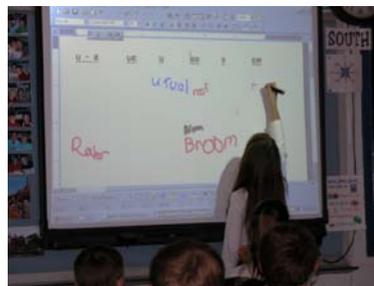
Figure 2 Interacting with IWT   Source: University of Waikato

French as a Second Language Program

The aim of the French as a Second Language (FSL) program is to develop basic communication skills in French and an understanding of the nature of the language, as well as an appreciation of French culture in Canada and in other parts of the world. The Core French programs offers Grade 4-12 students a valuable educational experience and the opportunity to develop a basic usable command of the French language that can be expanded through further study or contact with French-speaking people (Ministry of Education, 1998).

Technology Acceptance Model

The Technology Acceptance Model (TAM) is an information systems theory developed by Davis (1989) that models how an individual comes to accept and use technology. The model suggests that when people are presented with a new technology, a number of issues influence their attitude towards it, their intent of use and actual use. These issues include external factors; the individual's perceived usefulness and their perceived ease of use. The model is best represented by an illustration created by Davis (1989) (see figure 3).
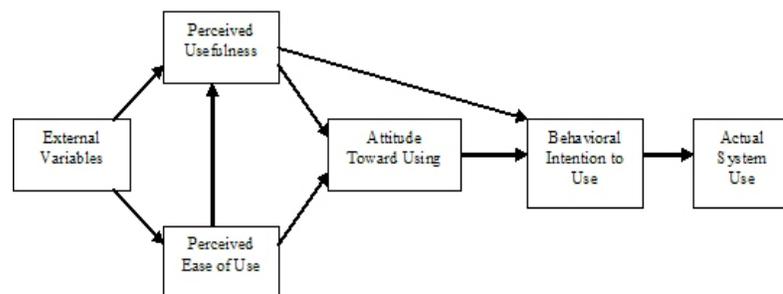
Figure 3 Technology Acceptance Model   Source: Davis, 1989

Modified Technology Acceptance Model

For this study, the model used is a modified version of Davis' Technology Acceptance Model (as described above). It is very similar with the exception of the omission of intent of use and actual use for those areas of investigation were not a part of my study (see figure 4). These aspects of the model were omitted due to time and scope of the study.
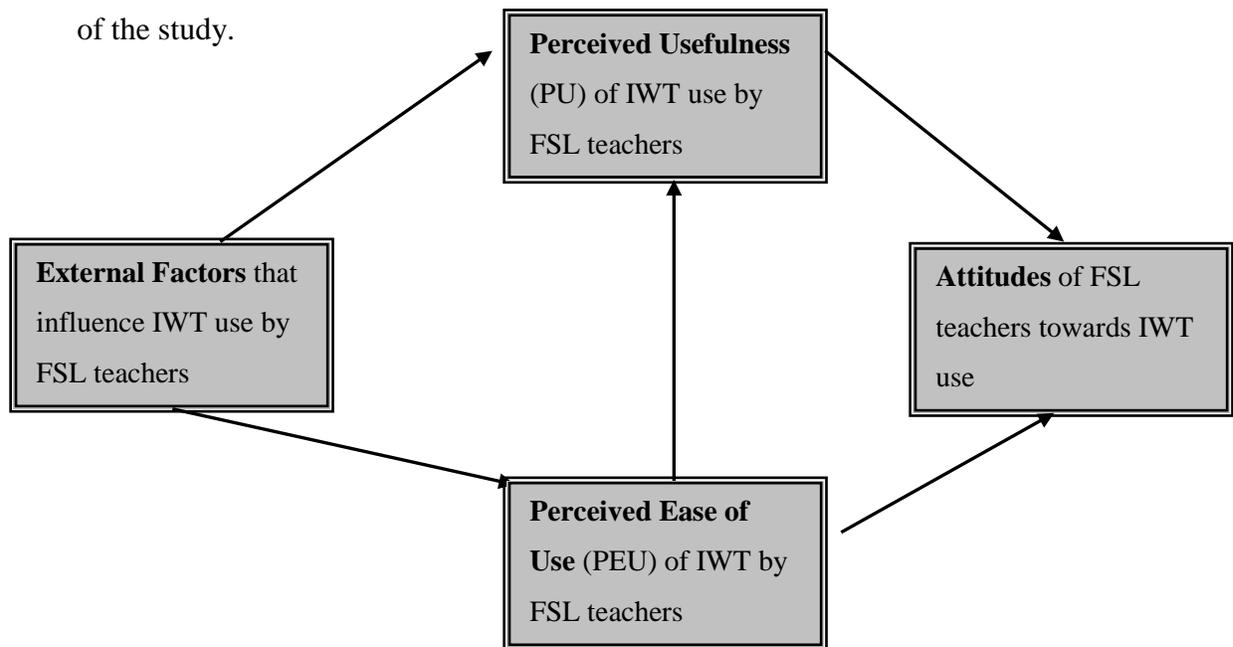
Figure 4 Modified Technology Acceptance Model   Adapted from Davis, 1989.

Overview of the Project

This project consists of six chapters. Chapter 1 provides the rationale for conducting this research project, the purpose of this project, and as well define the meaning of some of the key terms used throughout this paper. Chapter 2 provides a literature review on technology for second language learning, second language teaching methods, information communication technology use in second language classrooms,

interactive whiteboard technology and the technology acceptance model. Chapter 3

delineates the research methods by describing research procedures, participants and

ethical issues. Chapter 4 presents the research findings from the questionnaire and the

interviews. Chapter 5 discusses the findings of the study in the light of the relevant

literature, and considers the limitations of the study. Finally, Chapter 6 provides

concluding remarks.

CHAPTER 2

LITERATURE REVIEW

In 1987, as stated by Pea and Soloway, in a report for the U.S. Congress Office of Technology Assessment, technology might be the factor to help "bridge the ever-widening gaps between schools and society" (pp. 33-34). Much of the educational literature of the last few decades has expressed concern regarding the relevancy of what the education system is able to provide (with or without technology). Many of the studies, including Welburn's 1991 literature review, concluded that "the investigation of the impact of technology was just beginning" (p. 21). Later in the same year, Kerr (1991) stated that "those of us who try to foster the use of technology in the schools are often guilty of hubris: We start from a premise that the value of the new approach we urge is self-evident, and that teachers should naturally want to shift their ways radically to take advantage of the new." (p.117). Technology in the classroom has advanced rapidly over the last few years and there have been literally hundreds of published studies investigating its educational effect. This chapter will review such published scholarship to frame this study. The literature review is divided into four sections. The first section reviews research on information communication technology (ICT) in education. In this section the following themes are reviewed: the emergence of ICT, research studies in the field of ICT in education, ICT use in Ontario schools, an overview of computer assisted language learning (CALL), students' attitudes towards technology use for learning, the obstacles that second language (L2) teachers face when integrating ICT in their classrooms, and the methods teachers use to teach a second language. The second section

reviews literature on IWT use. The third section reviews literature on the TAM. Lastly, the fourth section summarizes the chapter and provides insights for this study.

Technology for Second Language Learning and Teaching

Emergence of Information Communication Technology in education

It is clear in reading earlier literature on ICT that the field itself, including the research was slow to emerge. As D'Ignazio (1993) described it, "businesses have been building electronic highways while education has been creating an electronic dirt road. And sometimes on a dirt road, it's just as easy to get out and walk" (p. 343). At that time, it was fairly obvious that education had not turned to technology to the same degree that the business community had and it could be argued that the education system had not done a very good job of evaluating the impact of the technology it had implemented. In 1994, Peck and Dorricott described schools as "rumbling along, virtually unchanged by the presence of computers" (p.12). Since then, the education system has evolved to encompass new technological innovations to foster better student achievement and to facilitate instruction. However, for the purpose of this study, it is important to review the literature of past trials and tribulations in order to understand the current state of ICT in schools today.

McKenzie (1995) outlined a number of reasons why the slow emergence and acceptance of ICT in education occurred. His reasons included the lack of time and resources required to conduct the necessary research as well as the lack of an understanding of how such research findings could be used beneficially, for instance, to inform future implementations. McKenzie also stated that "the most substantial research

into student learning with technologies has examined performance on lower order tasks and basic skills... Too little work has been done measuring gains in higher order skills" (par.4). He and many others (Hawkins and Honey, 1993, Riel, 1993, Ehrmann, 1995) who write on this topic, talk about large scale change and the accompanying need for careful planning (including the provision of professional development opportunities related to technology) to enable the maximum benefits for learners to occur.

When evaluating the benefits of technology in education the focus shifts between student and teacher. As early as 1975, the learner's relationship with technology as a means of acquiring knowledge was highlighted by Bork who emphasized the appeal of interacting with technology and how computer technology assisted students with learning (EDUCOM, 1999). He also emphasized that though in the presence of technology, the teacher's role still remains, it is the teacher's decision to decide what technology works effectively (EDUCOM, 1999).

As technology in relation to education grows strong, its specific tools and uses have become more and more complex. Papert (1993) described how computers play a part in education in describing a "Knowledge Machine" by which students could have a wealth of information at their fingertips by using speech, touch or gestures. This sort of machine, according to Papert, would allow children to explore a world "significantly richer" than that which is currently offered through printed books (p.8). This relationship between student and ICT would encourage students to take control of their learning while working with their peers and allow them to interact with ICT by way of computers as well as other multimedia resources. The teacher is also given the opportunity to use such

technologies to facilitate their own pedagogy. ICT use for education will be further examined in the following section by the review of several studies.

Research in the field of ICT use in education

For this portion of the chapter, key studies that take an empirical look at the larger picture of educational technology have been selected. In doing so, a better understanding of past research is gained. The reviewed empirical studies are categorized according to the type of study and incorporate important features such as an experimental approach, meta-analysis, longitudinal methodologies and/or large sample sizes.

Classroom-oriented studies

Studies of technology in the classroom have tended to focus rather narrowly on very specific learning outcomes (Lai & Kristonis, 2006; Zhao, 2003; Wang, 2005; Liu, More, Graham & Lee, 2002). For example, Peck and Dorricott (1994), in their study , observe success in the area of students' writing ability. Also, such studies rather frequently forget (at least at the beginning) to take into account the need for ongoing support to the teachers, although almost all reports on technology in the classroom end up mentioning this factor in their discussion sections (Beeland, 2002; Glover, Miller, Averis & Door, 2007). Hawkins and Honey (1993) state that it has "become clear over the past decade that simple motivational and short-workshop schemes are vastly insufficient to enable veteran (and even new, computer-generation) teachers to teach differently, and to teach well with technologies."Just as teachers need to learn how to teach with technology, students need to learn how to learn with technology." In a qualitative classroom study conducted by Montelpar and Williams (2000), they found that "students

were confident about the many advantages of an electronic curriculum, including its relevance, accessibility, convenience and self-directed approach. ... All participants mentioned difficulty encountered by the class having various levels of computer literacy." (pp. 91-93). These aspects of ICT use in education will be further explored by reviewing two specific large-scale longitudinal classroom-oriented studies.

Two large-scale longitudinal studies

The two studies described are both large-scale longitudinal experiments where technology was deliberately introduced into classrooms as the independent variable of the investigation. These two studies were chosen because the integration of technology (into the classroom and with the curriculum) was a key focus in both studies, and both monitored discrete skills (such as reading, writing, math, etc) as well as observed many other indicators of learning and attitudinal changes related to the new technologies. Each study also ensured that teachers were supported on an ongoing basis (and not through simple one-shot workshops) as they went through the technology-associated shifts in their modes of instruction. Though these two studies are from the past two decades they are relevant to establishing an overview of ICT research in education.

The first study, 'Computers Helping Instruction and Learning Development' (CHILD), was a five year investigation in nine Florida elementary schools, which began in 1987(Educational Programs that Work, 1995). Over 1400 students participated and their teachers received training which included not only the technological components of the program (3-6 computers were placed in each classroom) but also emphasized establishing a team environment with other teachers in the project. Much of the students'

daily routine involved self-paced interactions in a learning station environment. 'Student empowerment' was a key concept of the project.

Standardized test scores indicated a positive and statistically significant result across all grades, schools and subjects, with the largest effects appearing for students who had been in the program for more than one year. When surveyed, none of the nine schools expressed dissatisfaction with the project, five were planning to expand their level of participation and nine new schools were about to become involved (Educational Programs that Work, 1995).

The second study, Apple Classrooms of Tomorrow (ACOT) project, began in 1986 with the donation of equipment to the schools and homes of teachers and students. "Two years into the project, about 20 teachers and several hundred students had spent more time teaching and learning with technology than probably anyone on the face of the planet" (Dwyer, 1994). The Apple team worked closely with participants and "after nearly eight years of studying the computer's effects on classrooms, ACOT researchers have observed profound changes in the nature of instruction, learning, assessment, and the school culture itself" (p.1). At one of the ACOT teaching sites, computers were used successfully in a deliberate attempt to raise student test scores in vocabulary, reading comprehension, language mechanics, math computation, and math concept/application.

As with the CHILD study, increases in test scores were not the real objective of the project, and observations showing increases in how students employed inquiry, collaborative, technological, and problem-solving skills were considered to be the most

important findings. The technology was described as a 'conceptual environment' in which students generated, explored and expressed ideas.

The ACOT report discussed the broad support that teachers required (administrators needed to help by allowing flexible schedules, etc.) to incorporate the benefits that the technology provided. The traditional assessment requirements of the education system (e.g. student and teacher evaluations) were identified as the most serious barrier to the learning that was observed in the study and the report noted that if the shift to active learning was to thrive, there would need to be a change throughout all levels of education.

Three meta-analytic reports

The following three studies are examples of research that re-analyzed the combined outcomes of a large number of investigations that have been done individually on a small scale. By combining results, more general conclusions can be drawn than would be possible from the small studies alone.

First, Kulik and Kulik (1991) investigated studies of the effectiveness of software incorporating self-paced instruction. They found that a meta-analysis of educational technology studies conducted up to 1991 showed that such software improved learning outcomes (speed of learning and achievement) by a consistent 20%. Observations related to this milestone study include the statement that "few other teaching methods have demonstrated such consistently strong results" (Ehrmann, 1995), although it is also

observed that this type of software works best in areas such as mathematics or grammar exercises where there is clearly a correct answer.

Second, in 1996, the Software Publishers Association (SPA) commissioned an independent consulting firm (Interactive Educational Systems Design, Inc.) to prepare a meta-analytic report on the effectiveness of technology in schools. Research from 1990 to 1995 was included, and 176 studies were analyzed (Schacter, 1999). The report concluded "that the use of technology as a learning tool can make a measurable difference in student achievement, attitudes, and interaction with teachers and other students." With respect to achievement, "positive effects have been found for all major subject areas, in preschool through higher education, and for both regular education and special needs." Student attitude toward learning and student self-concept were both found to be increased consistently in a technologically-rich environment across the studies included, and in general, (although not necessarily for low achieving students who tended to require more structure) student control was found to be one of the more positive factors relating to achievement when technology was used.

Telecommunications capabilities, interactive video applications, and tutorial software providing feedback were among the features identified in effective technological tools for learning. Cooperative/collaborative environments were seen to be enhanced by the introduction of technology, which also increased teacher-student interaction.

The evidence suggested that teachers who use technology in their classrooms are more effective if they have received training, if they have district-level support and if

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they have a network of other computer-using teachers with whom to share their experiences (Schacter, 1999).

Third, and most recent is an analysis conducted by Zhao, Pugh, Sheldon and Byers (2002). The focus of this study is the identification of school site conditions that influenced successful integration of technology within classroom instruction. The primary purpose of the study was to address two main questions: "why don't teachers innovate their teaching practices when they are given computers?" and "why don't teachers integrate computers in their teaching in more meaningful ways?" The research focused on 118 K-12 teachers in Michigan that were awarded grant money with the intention of providing technology resources to the teachers for the purpose of student achievement and to encourage innovative teachers to expand their knowledge and use of technology in the classroom. The researchers followed the group of K-12 teachers for one year to observe the implementation of projects in technology rich classrooms. The researchers found that the success of classroom technology innovations was found to be influenced by three domains: (a) the teacher as the innovator (b) the project as the innovative tool and (c) the school as the context. They found that these domains did not contribute equally to the success of the technology innovation projects. The Innovator/Teacher had the most influence. This study was very complex and asked the same question as the SPA did a decade earlier, why don't teachers innovate when they are given computers?

Each of these studies provides insight into the research that has been conducted regarding ICT use in education. It does not, however, examine ICT use in Ontario-

specific curriculum delivery. To better connect my study, the following section will review what ICT use looks like today in Ontario schools.

What does ICT use in Ontario schools look like?

Teachers are faced with the challenge of adopting technology in their second language classrooms. It is clear that this challenge is not always about the computer devices and software; it is often about *what* second language learning should look like in today's classrooms. Here are a few of the many examples from the Ontario Public School Boards' Association (OPSBA) 2009 publications *What If: Technology in the 21st Century Classroom,* of what public school boards in our province are currently doing with ICT in their regular classrooms:

- The Simcoe County District School Board has provided video conferencing capabilities to all its schools, both elementary and secondary. The use of the equipment is gaining popularity with many conferences involving students from other schools around the world.

- Trillium Lakelands DSB District Principal, Diana Scates comments, "The *Virtual Learning Centre* is an online school and is known provincially as an early adopter of things like synchronous instruction with streamed audio and video, interactive shared whiteboards, online libraries of full text and streamed media, podcasting and voice threads." She adds, "Report card and attrition data coupled with online surveys suggests the program is the key to achievement for many students" (p. 8).

- Superintendent of Education of the Kawartha Pine Ridge District School Board, Robert Andrews comments on teacher use of technology in saying "There is

currently growing awareness that information communication technology can

augment student engagement. [...]Interest among teachers is strong with regard to

use of ICT when they are shown how it can help kids to be successful and when

supported with PD [professional development] and by administration" (p.11)

- According to Chief Information Officer of the Greater Essex Country District

  School Board, Mary Guthrie, "There is a strong desire, for the most part, from

  teachers wishing to use ICT in the classroom. This year [2009] saw increasing use

  of blogging, podcasting, class WebPages, internet use and literacy in the

  classrooms" (p.13).

The above examples are not out of the ordinary when it comes to teaching and

learning in elementary and secondary public schools in Ontario. They are, however, not

specific to FSL programming. Recent enthusiasm, however, for technology in language

teaching is growing amongst FSL teachers in Ontario.– witnessed for example, by the

large number of participants at the Ontario Modern Language Teachers' Association

Spring 2010 conference who attended workshops such as "Making French Fun: Using the

SMARTboard™, You Tube™, PowerPoint™ and More!" (OMLTA, 2010). It seems

that these new technologies are not only being seen as innovative from an ICT

perspective but are also being seen as revolutionary from a pedagogical standpoint. Over

twenty years ago, Lindenau (1984) argued that "we are all in the midst of a

microelectronic revolution," and pointed out that ignoring the arrival of such technologies

carries negative effects: "A blackboard and textbook system of education ...will

inevitably promote detrimental and far-reaching consequences" (p.119). Indeed, several

tools have lent themselves well to incorporation in the second language classroom, such

as audio tools, video, and computer, however, not without bringing a sense of déjà vu to FSL teachers.

Four decades ago, French language programs were also enchanted by promises of magic through technology. That technology – the audio-based language laboratory – brought disappointing results due to poorly produced commercial tapes, no learner appeal, lack of programs for advanced students, insufficient effort to make structural drills meaningful, and little faculty involvement (Holmes, 1980.). Thus before looking at the potential use of technology in language teaching today, it is worthwhile to take a brief historical look at past technology use in the language classroom.

Technology and language learning – a brief history

All means of language teaching have had their own supportive technologies. Language teachers who followed the grammar-translation method (in which the teacher explained grammatical rules and students translated from one language to another) relied on the blackboard – an essential tool for the one-way transmission of information from teacher to student. The blackboard was later supplemented with the overhead projector – another tool that facilitated teacher-centered pedagogy, as well as by early computer software programs which provided students with grammatical exercise drills.

Audio

Early researchers analysed technology-based language instruction tools such as the use of the phonograph for second language learning (e.g., Clark, 1918; Stoker, 1921), the use of the radio for distance learning (e.g., Bolinger, 1934; Cabarga, 1937), the use of the telephone (Twarog & Pereszlenyi-Pinter, 1988), and the use of the teleprompter (Buscaglia & Holman, 1980). Clarke (1918) commented on the novelty of using the

phonograph for second language learning and the possible benefits to students' memory

and motivation. Garfinkle (1972) argued the benefit of radio use in the classroom in

saying, the radio had "the technological resources to supply any language classroom, no

matter how remote with a wealth of stimuli from all over the world" (p.162). All in all,

each presented the positive pedagogical implications and applications of each audio tool

and how it enhanced the language learning process.

Video

As a natural extension of the use of audio tools, came the use of television

broadcasts for pedagogical purposes. Gottschalk (1965) argued that some "course

materials and exercises...would profit from visual presentations," because it is

"considerably easier for students to absorb both the abstract material given in lectures and

the visual aids used to illustrate these abstract materials" (p.86). With television, came

research in the use of film for second language teaching purposes (Lottman, 1991;

Hanley, Herron, & Cole, 1995; Swaffar & Vlatten, 1997). Swaffer and Vlatten (1997)

commented that the use of videos in second language teaching may be a helpful tool

because "videos expose students to authentic materials and to voices, dialects, and

registers other than the teacher's and provide cultural contexts" (p.174). This focus on

student engagement with authentic, meaningful, and contextualized discourse

transcended into computer assisted instruction that extended beyond grammatical

teacher-centered drills.

Computers

Since the initial introduction of computers into the field of second language education, a

large number of researchers have noted the benefits of computer technology for language

learning (Lai & Kristonis, 2006; Wang, 2005; Lui et al., 2002; Lee, 2000, Levy, 1997).

These benefits have led to the developing field of Computer Assisted Language Learning

(CALL). As this field continues to develop, many language educators are using

computers for more than just word processing. Language teachers use computers in the

classroom to present information using multiple modalities for communication, such as

text, audio, still picture and video. This shift in the direction of communicative language

teaching will be described in the following section.

Computer Assisted Language Learning (CALL)

What is CALL?

Research in CALL has been conducted for the past few decades. This research has

investigated CALL use in a variety of teaching and learning contexts and environments

as well as with numerous languages throughout the world. Its teaching and learning

potential in the field of language acquisition has been discussed and documented by

many researchers (Kulik & Kulik, 1991; Conrad, 1996; Escalada & Zollman, 1997;

Klassen & Milton, 1999; Levy, 1997; Peterson, 1998; Charischak, 2000; Vrtacnik et al.,

2000; Chapelle, 2001; Ayres, 2002; Shwienhorst, 2002; Bayraktar, 2002; Beatty, 2003,

Cushion & Dominique, 2002; Jung, 2002; Noriko, 2002; Robert, 2002; Blake, 2008).

Charischak (2000) stated that for a long time, basic drill and practice software

programs governed the field of CALL. In addition, Robert (2002) mentioned that there

has been a great increase at the turn of the 21st century in the number of learners who use

computers to assist them in their language studies. Cushion and Dominique (2002)

discussed the changes in computer based infrastructure by describing how the

technological developments at that time have provided the capability in overcoming

technical problems. Schwienhorst (2002) examined CALL while focusing on the benefits

of virtual reality environments for the purpose of foreign language acquisition.

Computers in language acquisition are not a new trend. For many years, second

language teachers have used computer-based resources to provide their students with

materials that exercise second language acquisition skills. In recent times, due to the

numerous advancements in the field of education technology, language teachers now

consider the use of computers as an indispensable tool to both, second language teaching

and learning. The potential for the use of technology in this area is grand and how CALL

is used by teachers and learners is crucial. This is evident in the research that focuses on

the use of CALL in second language teaching and learning.

In other words, CALL has the attention of researchers, writers, and software

developers. Peterson (1998) asserts that CALL has developed from small beginnings into

a major element in many university programs. The number of teachers who now

incorporate CALL materials in their classes has increased and as well their background

knowledge in implementing such resources has expanded. In addition, educational

technology like CALL has increased the number of CALL-friendly facilities in

educational settings. Moreover, CALL has become a focus for research.

CALL specific research

In reviewing the CALL specific literature, some writers have devoted entire books

for the discourse surrounding CALL. Kulik and Kulik (1991), for example, conducted a

meta-analysis of findings from 254 controlled evaluation studies from which they found

that computer-based instruction (CBI) usually produces positive effects on students. The studies in their analysis covered a wide range of learners of all levels and ages. In addition, Levy (1997) wrote *Computer Assisted Language Learning: Context and Conceptualization*, consisting of eight chapters devoted to the field. Levy's work provides the reader with a historical review of CALL and surveys the trends in CALL. Similarly, Beatty (2003) identifies the place of CALL in research and teaching as well as its relation to various second language acquisition theories. The author discusses how to conduct research pertaining to CALL, as well as reviews 145 CALL research papers and provides a framework for action-research in the interest of CALL.

Conrad (1996) noted that there has been insufficient research conducted surrounding the effectiveness of CALL and that the 19 empirical studies he mentioned were centered on more than a dozen area of CALL applications. More recently, Jung (2002) wrote an extensive bibliography on CALL where most citations were post-1997 journal articles and book publications that documented the many applications of CALL as well as their positive effects on student achievement and teacher instruction.

In the same year as Jung (2002), Bayraktar (2002) conducted a meta-analysis of the effectiveness of computer assisted instruction (CAI) on student achievement in secondary and post-secondary education by comparing it to traditional instruction. Results from this meta-analysis showed a small positive effect for CAI use when applied in tutorial models, with individual computer use, and when used as a supplement to traditional instruction. Blake (2008) also looked at the effectiveness of CAI on student achievement by observing how individuals interact with each other, how individuals

interact with technology, and how individuals interact with one another in the presence of technology in the classroom.

Students' attitudes towards learning in a CALL environment

In the reviewed literature, the attitudes towards CALL and other types of educational technology are just as prevalent as their implementation. In the majority of the reviewed scholarly studies positive attitudes towards CALL were shown and documented in research. The following depicts several examples pulled from CALL research. Escalada and Zollman (1997) demonstrated the effects on student learning and attitudes of using interactive digital video in the physics classroom. Though not specific to language learning, this study showed that interactive video materials were appropriate for a learning environment that encourages activity-based learning. Klassen and Milton (1999) evaluated the effectiveness of a multimedia based ESL program at a Hong Kong university. The results demonstrated that positive attitudes from students towards the multimedia enhanced learning. Similarly, according to Vrtacnik et al. (2000) when computer-based approaches were introduced in the classroom, students' achievement rates were higher and students displayed better attitudes towards the subject area.

More recently, Ayres (2002) examined students' attitudes towards the use of CALL and reported that the participants' attitude towards language learning increased significantly. In addition, the study revealed that there was a link between pupils' attitudes and their level of computer literacy, language level and age. Similar results were found in Roberts (2002) who examined students' attitudes towards the use of CALL, and their perceived view of its relevance to their course of study.

In 2002, Noriko developed a language tutor program to develop learners' grammatical and sentence production skills in the Japanese language. The study revealed that students' achievement improved tremendously. Also included in this study was a questionnaire component that measured the overall attitude of the students towards the program. The results derived from the questionnaire indicated an enthusiastic student response.

From this reviewed scholarly work it can be concluded that the use of CALL is beneficial for language learning as well as for procuring positive student attitudes towards CALL – particularly if CALL applications were well-designed and used; however some questions were also raised.

Obstacles faced by second language teachers when teaching with ICT

When examining the research, the external factors inhibiting the practice of Computer-assisted Language Learning can be classified in the following common categories (a) financial barriers, (b) availability of computer hardware and software, (c) technical and theoretical knowledge, and (d) acceptance of the technology.

Financial barriers are mentioned most frequently in the earlier literature by language education practitioners (Hooper & Hannafin, 1986). They include the cost of hardware, software, maintenance (particularly of the most advanced equipment), and staff development. Though the initial investment in hardware was high, inhibiting introduction to advance technologies, Hooper and Rieber's (1995) prediction that the cost of

computers will be so low that they will be available in most schools and homes in the future has proven to be true.

Currently, the majority of elementary and secondary school teachers and students in Ontario have used technology in one way or another when teaching and learning. In September 2009, the Ontario Limestone District School Board stated long term plans for the continuous renewal of operational and educational technology by supporting school based websites, increasing the number of teachers using current education technology, and by increasing wireless internet access in schools (Limestone DSB, 2009). The pairing of technology and education is evident as initiatives such as these are being taken both locally and abroad (World Summit, 2009).

Herschbach (1994) argued that new technologies are add-on expenses and will not, in many cases, lower the cost of providing educational services. He stated that the new technologies probably will not replace the teachers, but will supplement their efforts, as has been the pattern with other technologies. He believed that the technologies will not decrease educational costs or increase teacher productivity as currently used. Low usage causes the cost barrier. Educational technologies are implemented by teachers in very few hours of the day, week, or month. Either the number of learners or the amount of time learners apply the technology or the amount of time teachers implement the technology must be increased substantially to approach the concept of cost-effectiveness.

Towards the end of the 20th century, the most significant aspects of computer assisted learning and instruction were the availability of high quality hardware and software (Herschbach, 1994; Miller, 1997; Office of Technology Assessment, 1995).

Underlying this problem was the lack of knowledge of what elements in software will promote different kinds of learning. In addition, there are few educators skilled in designing it because software development is costly and time-consuming (McClelland, 1996). McClelland indicated that having sufficient hardware in locations where learners have access to it was problematic and was, of course, partly a financial problem. In addition, choosing hardware was difficult for educational institutions because of the many choices of systems and equipment that could be used in delivering education as well as the rapid changes in technology.

The literature of the last decade, however, has shown great change in this regard. There is no shortage of learning software and much funding supports educational software and the development of various e-curricula for both learner and instructor. The focus is now placed on the effective integration of the various educational technology applications available to teachers. Haymore Sandholtz and Reilly (2004) asked the question: Why, despite many efforts at the national, state, and local levels to promote the use of computers in K-12 classrooms, over the past 20 years, the impact of the computer on teaching and learning has been minimal? The authors examined how one school district has advanced the use of computers in the classroom by focusing first on curriculum rather than on technology. Their research offered a paradox for furthering the use of computers in classrooms by taking away expectations for technical skills and allowing teachers to focus on developing curriculum, evaluating learning materials, and thinking about how to provide better learning opportunities for their students. In doing so

the researchers conclude that teachers are likely to use technology more effectively and creatively in their teaching.

A lack of technical and theoretical knowledge, however, continues to be another barrier to the use of CALL technology as many instructors do not understand how to use the new technologies to their benefit or to the benefit of their students. Furthermore, little is known about integrating these new means of learning into an overall plan.

The reviewed research emphasises that we live in a time of change. Murphy and Terry (1998) indicated that the currents of change move so quickly that they destroy what was considered the norm in the past, and by doing so, create new opportunities. But, there is a natural tendency for organizations to resist change. It was found that instructors tended not to use educational technology applications that required substantially more preparation time (Herschbach, 1994). The role of teachers will however continue to diversify as educational use of technology increases. These professionals will need to be knowledgeable and skilful in a variety of technological applications in order to meet the demand of their students. Teachers are and will continue to be expected to correspond with students and faculty members via email as well as develop digital instructional content, run web-based applications and have the knowledge to access the most current resources available to them online. Snyder (2004) writes, "This is no time to try and revivify 20th century schools or to push faculty and administrators to deliver 21st century graduates without investing in 21st century technology and the training to master that technology." It is clear that these skills will be an integral part of the role of the teacher and will place emphasis on professional development in the area of CALL.

From the literature of the past two decades, it is evident that engaging in ICT use in education was, is, and will be a continuing challenge that requires time and commitment from all involved. The literature provides a realization that ICT use is not the answer to all current instructional and learning problems. It is evident that what really matters is how ICT is used. Research has emphasised that computers can and will never substitute teachers but they offer new opportunities for better language practice (Hooper & Rieber, 1995; Montelpar & Williams, 2000; Myers, Saunders & Rogers, 2002; Goran & Reynolds, 2005). When ICT is implemented, the role of the teacher must not be overlooked. The majority of the reviewed studies concerning ICT use in education stressed the importance of the teacher's presence in the successful implementation of curriculum. Hooper and Rieber (1995) emphasise that when the teacher is present, he or she can combine technology and pre-existing learning materials in such a way that encourages learners to make real world connections. Myers, Saunders and Rogers (2002) encourage a "hybrid approach" when implementing ICT. By incorporating technology with a traditional format of lectures, students receive student-centred learning as well as teacher-centred learning. This format is also mentioned in several studies (Montelpare &Williams, 2000; Goran &Reynolds, 2005) that observed that students were more successful when ICT was supplemented with classroom assignments, homework as well as family activities at home. It is evident that technology and an instructor must both be present in order to ensure the successful implementation of ICT in the classroom.

As has been said, we are living in a time of change and in order to evaluate these technological advances in education, research in the area of ICT must be continuously reviewed.

An Overview of Second Language Teaching Methods

From the second language teaching literature reviewed, it is clear that the method by which a teacher instructs students has a great impact on what the students learn and the level at which they achieve. Brown (2000) identifies several key methods in *Principles of Language Learning and Teaching* as does Chapelle (1998). These methods include the direct method, the communicative method, the audiolingual method and the grammar translation method. The following is a brief review of second language teaching methods that the second language learner may encounter.

The main idea of the direct method is that second language acquisition should be "very similar to first language acquisition, with a lot of spontaneous verbal communication, no translation, and little or no mention of grammar" (Brown, 2000, p 44-45). The criticism of its weak theoretical foundations may have been due to the realization that first language acquisition is not the same as second language acquisition. The principles of the direct method are reviewed by Richards and Rogers (1986) in Brown (2000) as followed:

> Teacher instructs only in the target language, common usage of words, phrases and sentences are taught, teachers begin with simple oral exchanges with students, then progressively to more difficult. Teaching aims are conducted orally. Tactile objects, pictures and demonstrations are used to teach concrete vocabulary, while association of ideas is used for abstract vocabulary. Accurate pronunciation and correct grammar are emphasized (p.45).

Brown (2000) explains that the communicative approach was both the result of and departure from previous approaches. According to Brown (2000) the communicative

method takes into account the essential need for real communication in second language acquisition, and also utilizes the advantages that older students have over young children. Brown (2000) summarizes the main characteristics of the Communicative Approach as followed:

> All elements of communicative ability are the focus of classroom goals and are not limited to only speech and grammar; Language is used in real and meaningful ways, without an overemphasis on language forms; Fluency and accuracy are both important principles, but accuracy may take a backseat to fluency to maintain students' interest in meaningful conversation. However, at the risk of communication breakdown, fluency should not be advocated in place of clear, coherent, communication; Students are encouraged to speak freely and to use unrehearsed dialogue receptively and productively rather than being controlled by the teacher or by overemphasis on language forms (p.267).

The audiolingual method developed during WW1 when the American army began intensive oral/aural courses known as the Army Specialized Training Program (ASTP) and were later adopted by educational institutions as the audiolingual method (Brown, 2000). The features of the audiolingual method are summarized by Prator and Celce-Murcia (1979) in Brown (2000) as followed:

> A reliance on memorization of phrases, mimicry and overlearning; Sentences and structures are learned by repetition; Little attention is paid to the explanation of grammar; New words are learned in context; Students are encouraged to speak only the target language; Proper pronunciation is essential; Reinforcement of accurate responses; Meaning and content considered not as important as proper manipulation of the language (p.74).

The audiolingual method began to decline as students failed to achieve long-term communicative capability. It was realized that "habit formation, overlearning and avoidance of errors was not the best way to learn a second language" (Brown, 2000, p.75). Although the audiolingual method provided potentially good tools for second

language acquisition, its lack of concentration on meaning and fluency, according to Brown (2000), detracted from its success.

The grammar translation method was the prominent teaching method in the eighteenth and nineteenth centuries: It focused on "grammatical rules, memorization of vocabulary … translations of texts and doing written exercise" (Brown, 2000, p.15). It provided a means for scholarly instruction and reading proficiency, but little time for oral communication practice. Brown (2000) describes the method as one by which students learned about the language but not how to use it. Prator and Celce-Murcia (1979) in Brown, (2000) outline the main features of the method:

> Teacher uses first language a large majority of the time giving minimal reference to target language; Vocabulary is taught in lists and out of context; Complexities of grammar are explicated in long detail; Form and inflection are the focal point of grammar instruction and correct sentences are created by following grammatical rules; High level of reading material is introduced early; Text reading is used for grammatical analysis and content is considered secondary; Drills consist of translating sentences taken out of context; Little if any pronunciation practice. (p.15)

Despite its persistent worldwide popularity, Richards and Rodgers (1986) in Brown (2000) point out "it has no advocates…there is no literature that offers a rationale or justification for it…" (p.16).

Chapelle (1998) identified a second language model that focuses on language input acts as "the potential starting point for acquiring aspects of the L2" (p. 22). This model attempts to articulate what makes input comprehensible and how it is processed to influence the development of the learner's linguistic knowledge (Chapelle, 1998). She also provides seven hypotheses about ideal conditions for second language learning: (1)

The linguistic characteristics of target language input need to be made salient. (2)

Learners should receive help in comprehending semantic and syntactic aspects of

linguistic input. (3) Learners need to have opportunities to produce target language

output. (4) Learners need to notice errors in their own output. (5) Learners need to correct

their linguistic output. (6) Learners need to engage in target language interaction whose

structure can be modified for negotiation of meaning. (7) Learners should engage in L2

tasks designed to ☐ehavior opportunities for good interaction. Chapelle reviewed these

hypotheses and gave their theoretical and empirical bases.

The methods described here are only a few that teachers use in the second

language classroom. From these methods, it is evident that there is considerable

importance placed on the input and interaction that take place in the classroom. It is also

clear that when developing CALL student applications and CALL instructional resources

for second language learning and teaching, it is important to consider existing language

teaching methods.

ICT use in Second Language Classrooms

In order to investigate IWT use by FSL teachers, I found it relevant to review the

literature that illustrates second language teaching methods with ICT. Mayer (2005)

comments that language teachers are using technology to create "multimedia

environments" that include "online instruction presentations, interactive lessons, e-

courses, simulation games, virtual reality, and computer-supported in-class presentations"

(p.1). This shift in the direction of communicative language teaching has lead to two

distinct perspectives: cognitive and socio-cognitive, both of which have their implications in terms of how a teacher teaches a second language using ICT.

Tools for cognitive approaches

Cognitive approaches to communicative language teaching are based on the view that learning a language is a unique psycholinguistic process. From this perspective, language learners develop a mental model of a language system, based not on habit formation but rather on innate cognitive knowledge in interaction with comprehensible, meaningful language (Chomsky, 1986). In regards to language teaching, Chomsky's theory contributed to a gradual shift in goals from instilling accurate language habits to fostering learners' mental construction of a second language system.

With this theory in mind, it is safe to say that technologies that support a cognitive approach to language learning, in this case FSL, are those which allow learners maximum opportunity to interact with meaning-rich contexts through which they construct and acquire competence in the language. Three possible types of technology that support a cognitive approach to FSL learning are concordancing software (e.g. Word Smith Ultra Find, Monoconc), text-reconstruction software (e.g., Storyboard, Eclipse, NewReader from Hyperbole or Text Tanglers) and multimedia simulation software. While these programs are often used individually, in pairs or groups, the software programs alone do not lend themselves to human-to-human language exchange and interaction. The socio-cognitive perspective is explored in the section to follow.

Tools for socio-cognitive approaches

Socio-cognitive approaches, in contrast to cognitive approaches, emphasize the social aspect of second language acquisition. Learning a second language is viewed as a

process of socialization into the particular target language discourse community, in this case French (Schieffelin & Ochs, 1986). From a socio-cognitive perspective, FSL students need to be given maximum opportunity for interaction with the target language because a language is learned so that people can communicate with each other (Alberta Education, 2007). Students need access to French language input as well as opportunities for their own practice of the language in both constructed and free-speech settings. This can be achieved through student collaboration on authentic tasks and projects while simultaneously learning both content and language (e.g., Flowerdew, 1993).

As most FSL learners in Ontario schools cannot go abroad to learn a second language, finding other ways of increasing their exposure to the target language is paramount for their second language development. The Internet has proven to be a powerful tool for assisting FSL teachers in a socio-cognitive approach to second language learning. The internet can be used in countless ways in the FSL classroom, however, due to the constraints of this chapter, only a brief discussion of two online features that facilitate communication in the FSL classroom will take place.

Websites

The World Wide Web offers a vast array of resources for FSL teachers and students. While the majority of Web pages are in English, the second most prevalent language on the internet is French (Canadian Parents for French, n.d.). Accessing and using these pages in language education supports the socio-cognitive approach by helping immerse students in discourse that extends well beyond the restrictions of their classrooms and textbooks. Students can use websites to access authentic materials for conducting research on cultural and current events or for gathering material for class

projects. Teachers can design WebQuests for their students using French or bilingual websites. These materials can be accessed 24 hours a day. Accessing websites also provides interdisciplinary and multicultural learning opportunities for students to carry out self-regulated learning.

FSL teachers can also encourage their students to publish their work such as essays, poetry and stories on the internet. Numerous Ontario public schools, for example, are making use of the internet for publishing student work which can be accessed by other web users (OPBSA, 2009). In this way, students become not only consumers of online content, but in fact generate the language content themselves.

Moreover, numerous websites have been created to help FSL learners practice their French. The majority of these websites are free for students to access. One of the most commonly accessed website is *FSL Activities with M. Renaud*, created by an Ontario French Teacher. In 2007, 7.5 million pages from this site were visited (Renaud, 2010). Like many FSL practice websites, *M. Renaud* provides printouts, links to French websites, online French games, links to current news, and tips for learning French. *M. Renaud* is just one example of how the internet provides supplemental language activities for students for additional practice in specific areas of language learning. There are many other sites available like this one that include reading tests and comprehension questions, grammar exercises, pronunciation exercises possible through the available multimedia capabilities, cloze tests, vocabulary exercises, and so forth. Students and teachers can search the internet for such sites or refer to a published recommended list of websites for FSL learners/teachers.

Secure Online Communities

As more and more students have access to the internet both at school and at home, teachers are making use of secure online communities in order to communicate with their students, as well as a place for their students to communicate with one another. This technology makes it possible to hold discussions in private with a select group of participants. Such examples include Wikispace; Moodle; WebCT; Blackboard; Elluminate Live! And the Nicenet Internet Classroom Assistant. These technologies are a primarily asynchronous form of communication, whereby participants can post text and audio files for their peers to access and respond to. Other features of these management tools may include a synchronous communication feature (communication that occurs in real time) that would allow for oral conversations by way of microphone and earphones or writing conversation by way of instant messaging. The system may also feature an interactive whiteboard that allows teachers and students to write and create visual representations to be discussed as a group at the same time.

Online communities, like those mentioned, developed by teachers for FSL learning might be viewed as an artificial substitute for the face-to-face communication that would occur in a regular classroom. It has been found however, that online discussion communities have a number of different features that extend both oral and written communication. First, online discussion communities have demonstrated to be more democratic than in-class discussions; teachers or a few outspoken students are much less likely to dominate an online forum as the medium encourages more equal participation resulting in discussions which are much more collaborative in nature (Kelm, 1992; Kern, 1995; Warschauer, 1996; Rosenberg, 2001; Clark & Mayer, 2007). Second,

online discussion communities allow students to better notice their peers' input from either speech or typed instant message. Students then have been incorporating that input into their own messages, thus expanding opportunities for learning of new expressions (St. John & Cash, 1995; Wilson & Whitelock, 1997). Third, online discussion communities in L2 that have an instant messaging feature allow students to practice their second language writing skills. The online environment allows students more planning time for thought generation and expression than if they were in a face-to-face classroom. Warschauer (1996) found that with instant messaging, students tended to use language which was lexically and syntactically more complex. Lastly, when students are participating in an online discussion community they are using their second language skills in an environment other than their classroom. It gives students another opportunity to use the language that they are learning with their peers.

From the reviewed research it is evident that there are numerous ways ICT can be used in a language learning environment to assist teachers and learners. It is also most evident that second language teachers are teaching a generation of learners who have no memory of a world without ICT – soon it will be the same for new teachers. The use of ICT in the second language classrooms is possible through a variety of tools. The following section will discuss the tool in question for this study – the interactive whiteboard. This interactive ICT tool was chosen for this study because it provides a better variety of means to access outside sources than simple white board technologies, adds a lot of flexibility, is interactive, engaging and is gaining popularity in today's schools.

Interactive Whiteboard Technology

Like other means of ICT use in education, IWT is a tool that supports both teaching and learning (Gérard & Widener, 1999; Ball, 2003; Walker, 2003; Miller & Glover, 2006; SMART Technologies, 2006; Smith et al., 2006; Kaufman, 2009; Lacina, 2009; Weinberg, 2010). Software provided with the board or obtained separately provides a variety of functions, including those which replicate non-digital technologies such as flipcharts, dry-wipe boards, overhead projectors, slide projectors, opaque projectors and video-players, and others which have not previously been possible on a large, vertical display, such as: drag and drop (objects on the board can be moved around), hide and reveal (objects placed over others can be removed), highlighting (transparent colour can be placed over writing or other objects), animation (objects can be rotated, enlarged, and set to move along a specified path), indefinite storage and quick retrieval of material, feedback (when a particular object is touched, a visual or aural response is generated) (Glover et al., 2005).

Since Canadian company SMART Technologies Inc. manufactured the first interactive whiteboard in 1991 which was adopted by teachers and used in the classroom, it has been the topic of numerous empirical studies. Such research has concluded mixed-outcomes and is quite varied in terms of length and size of study, complexity, age of students, grade level and subject area as well as the usefulness of the studies' findings. Also varied amongst the studies is what is meant by the words *interaction and interactive.* Several authors including Kennewell (2007) and Cutrim Schmid (2006) make a distinction between interactivity in a technical or physical sense (the functions of the board such as the production of sound when you touch a picture) and the promotion of cognitive interactivity (question/answer leading to comprehension verifications). Another

type of interaction that takes place in the presence of IWT is socio-cognitive interactivity. Lantane (2002) defines this type of interaction as the co-construction of knowledge, encouragement of reflection, brainstorming of ideas between teacher and students as well as between students and students. Despite these definitions, it is ultimately the views of the teacher about what interaction means and how they define their role in the presence of IWT that impact the way IWT is actually used (Goodison, 2003). In this section , several of these IWT studies will be reviewed and are presented in four parts: (1) varied findings (2) the changes and improvements to learning and teaching practices (3) challenges and (4) recommendations.

Varied Findings

In reading various literature on IWT use in the educational classroom, there is much variation amidst the findings. On the one hand there are reports and studies that identify how IWT have been used to significantly improve teaching practices and student test scores. These studies have investigated aspects such as the technological features of IWT, how IWT helps teachers model and explain difficult concepts and how IWT engages and motivates students (Kennewell & Beauchamp, 2007; Smith et. Al., 2005; Tate, 2002; Solvie, 2004). For example, Wallace (2007) suggests that IWT and its software create a more captivating learning environment for students. Other studies have investigated the impact of IWT on different learning styles including students with special needs (Salintri et al., 2002; Zirkle, 2003) On the other hand, other researchers suggest that by simply introducing IWT to classrooms is insufficient. Higgins et al. (2007) note that it is the skills and professional knowledge of the teacher mediating interactions with students that is the deciding factor of how much value is gained from

IWT use. Moss et al. (2007) comment that though IWT may allow teachers to organize and manage information as well as their classrooms and lesson content more effectively and efficiently, its use does neither automatically lead to improved teaching nor a better learning experience for students. Regardless of the findings from the studies reviewed here, they present the changes and improvements to learning and teaching practices, the challenges to teachers and recommendations for future research.

The changes and improvements to learning and teaching practices

The research in the field of IWT use for educational purposes identifies a broad range of positive impacts on education. These include findings that suggest positive impact on student sense of positive identity (Somekh et al, 2006; Somekh & Haldane, 2006; Walker, 2003); increased enjoyment of learning (Adrian 2004); engagement and motivation of students (Beeland, 2001; Beauchamp & Parkinson, 2005; Morgan, 2008). IWT use also has specific benefits for teachers. IWT use in the classroom supports and facilitates the ease of integration of ICT in classroom teaching (Smith, 2001; Balanskat et al., 2006). Kennewell (2001) found that IWT use offers flexibility and saves time because a wide range of web-based resources can be applied, adapted and customized. Once the teacher has developed the content, it can be stored electronically or printed in turn facilitating reuse by the teacher and students (Kennewell, 2001; Walker, 2002). In addition, the materials that a teacher develops can be easily shared with other teachers, eventually reducing a teacher's workload (Glover & Miller, 2001; Balanskat et al., 2006; Kennewell, 2004).

In addition, IWT use allows for spontaneous and collaborative teaching and learning (Kennewell, 2006). Students and teacher can learn together on the board by way

of internet search activities to uncover more about a topic or by creating or downloading a simulation to explain a concept. IWT lends itself well to collaborative problem solving strategies, discussions and choice-making. For example, when matching newly learnt words to pictures, the teacher can coach the discussion about options or the students can help each other in making choices. However, while these changes may be possible, their realization depends heavily on the teacher's ability to use IWT effectively.

Challenges

Though there are many advantages presented in the literature on IWT use, disadvantages that challenge teachers and students have also been reported. It appears that when teachers have access to IWT, the amount of time spent on whole-class activities increases at the expense of time for group work (Wood, 2001; Smith et al., 2006; Stuart, 2005; Higgins, 2005). In addition, the centrality of the teacher is reinforced (Stuart, 2005; Vandewyer, 2007). Other disadvantages reported include physical and financial limitations. Not all schools can afford IWT nor are they all wired to accommodate the technology (Smith et al., 2005). Moss et al. (2006) observed in secondary classrooms equipped with IWT that the novelty of the device wears off and no longer serves as a tool to motivate and engage students. Teachers have also been found to avoid using the technology as a result of lack of confidence in IWT use (Duivenvoorden, 2006), and to experience frustration with various technical issues or their own lack of IWT skills (Levy, 2002; Hall & Higgins, 2005).

Two of the most frequent issues raised in the reviewed research are the need for adequate training in order to use IWT to its full potential and the various difficulties related to the practicalities on IWT use. First, teachers' inexperience in setting up

equipment and in manipulating features on the board, leading to lesson disruption, was a concern for both teachers and pupils interviewed in Levy's study (2002). Interviewees in Glover and Miller's study (2001, p. 261) found that initial training by companies and suppliers with their 'slick presentation and high-quality prepared materials' were successful in 'firing' teachers with initial enthusiasm (Glover & Miller, 2001, p. 261). The long-term value of such training, however, remains more questionable, as one teacher interviewed by Walker (2003b, p. 2) put it, 'if you don't catch them at the start, provide support and show them how to use learning material, their enthusiasm quickly wanes.' Some researchers have highlighted that even when a teacher aims to use IWT as a transformative pedagogic tool (Burden, 2002), lack of practical and methodological training can impede and frustrate such aims (Malavet, 1998; Greiffenhagen, 2000). IWT use must go beyond the wow factor and "teachers must learn to explore the potential of interactivity for enhanced learning" (Beauchamp & Parkinson, p. 101). The empirical research points to effective IWT use where teachers have been convinced of the value of technology and fully understand the nature of interactivity and its pedagogic implementations. Beeland (2002) found that teachers who are both competent and confident in technology use then seek changes to the way in which they teach. Second, there have been numerous difficulties with IWT equipment in classrooms that hinder the learning and teaching with IWT experience. In one UK school it was reported that students found it difficult, or even impossible, to see the interactive whiteboard screen when sunlight was shining directly on it (Tameside MBC, 2003). This has implications for the positioning of a board within a classroom and suggests the need for effective blinds (Levy, 2002). Visual problems are heightened by the use of distracting colours and

fonts and the presence of dust on the screen or projector lens. Teachers report that they need to stand to the side of the board or a shadow is cast over the screen (Bell, 2001; Walker, 2003b), a difficulty also experienced by students interacting with the board (Smith, 2001). Concerns are often expressed regarding the health and safety implications of the numerous wires required or IWBs and associated equipment (Bell, 2001; Smith, 2001; Tameside MBC, 2003). The height at which the board is installed can be an issue, particularly where boards are permanently fixed and if young students are to use them (Tameside MBC, 2003). If the board is not installed and is on wheels, the calibration when disturbed requires re-alignment: a major inconvenience if it happens every time a student tries to use the board (Bell, 2001; Smith, 2001; Tameside MBC, 2003).

From the research is it evident that teachers should have adequate ICT skills and that training of IWT use is absolutely necessary. The training must be tailored to the individual needs of the teachers and a subject-specific component is of great importance (Levy, 2002). Students, too, must learn how to work with IWT to allow for active participation (Glover et al., 2007). Overall, the IWT research reviewed presents a predominantly positive picture of the educational possibilities of IWT use. IWT contributes to the presentation of information and resources and to the facilitation of interaction and organization of activities. On the other hand, it is fair to say that the potential and effectiveness of IWT use relies heavily on the teacher. As one commentator noted, " in the hands of a teacher who is interested in developing the independent, creative, thinking skills of their students, [the IWB] will be used to further these purposes. . . It's not what you use it's how you use it" (Virtual Learning, 2003b, p. 4).

Technology Acceptance Model

Information communication technology (ICT) acceptance has received

considerable attention in the past two decades. Several theoretical models have been

proposed to explain end-users' acceptance behavior of technology. Among them, the

technology acceptance model (TAM) proposed by Davis (1989) has been widely applied

and empirically tested (Davis, 1989; Venkatesh & Davis, 2000; Moon & Kim, 2001; Hsu

& Lu, 2004; King & He, 2006, Legris, Ingham & Collerette, 2003). There have been

numerous empirical studies conducted on TAM since its creation. Compared with its

competing models, TAM is believed to be more economical, predictive, and robust

(Venkatesh & Davis, 2000).

Davis (1989) applied the Theory of Reasoned Action (Fishbein & Ajzen, 1975)

and developed TAM to explain the usage of information technology. The Theory of

Reasoned Action (TRA) proposes that beliefs influence attitudes, which in turn lead to

intentions, and then generate behaviours (Fishbein & Ajzenm, 1975). TAM adopts TRA's

causal links to explain individual's technology acceptance behaviours. It suggests that

perceived usefulness (PU) and perceived ease of use (PEU) of technology are major

determinants of its actual usage. Davis (1989) defined perceived usefulness as "the

degree of which a person believes that using a particular system would enhance his/her

job performance" and perceived ease of use as "the degree of which a person believes

that using a particular system would be free of effort" (p.3). Consistent with TRA, user's

beliefs determine the attitudes toward using the system. Behavioral intentions to use, in

turn, are determined by these attitudes toward using the system. Finally, behavioral intentions to use lead to actual system use.

Previous research has demonstrated the validity of this model across a wide variety of ICT (Davis, 1989; Moon & Kim, 2001; Hsu & Lu, 2004; King & He, 2006, Legris, Ingham & Collerette, 2003). King and He (2006) identified 88 studies published on the TAM. The results of this meta-analysis confirm that the model can be used in a wide variety of contexts and that the impact of ease of use on the intent to use is mainly brought about by perceived usefulness. In a critical review of the TAM, Legris, Ingham & Collerette (2003) retained 22 studies that tested the model in its integrity with a well-defined methodology as well as complete and available results. Their conclusions follow the same direction as those of King and He (2006), that is, the TAM is a theoretical model that can be used in different contexts to help understand and explain the use of information technologies.

Most recently Shen and Chuang (2009) noted that one obstacle to TAM usage is applying it beyond the workplace. This is because TAM fundamental constructs do not fully reflect the variety of user task environments. Another drawback is noted by Dishaw and Strong (1999) who observed that a weakness of TAM is its lack of task focus. The literature on the TAM applied to IWT use is limited and is non-existent when the specified user is an FSL teacher. Therefore, to increase external validity of TAM, it is necessary to further explore the nature and specific influences of technological and usage-context factors that may alter the user's acceptance as well as vary who the users are and for what purpose the technology in question is being used.

Summary and Insights for this Study

It is evident through the literature review that there is ample research in each of the following areas: technology for second language learning and teaching, second language teaching methods, ICT use in second language classrooms (i.e., FSL), interactive whiteboard technology and the technology acceptance model. In the educational, modern language and information communication technology research data bases available to me, I did not come across any research that encompassed all of these areas. There have been studies on technology use for FSL learning and technology acceptance of IWT; however none that focus on the FSL teachers' perceptions of IWT use, perceptions of ease of use, their attitudes nor the external factors that influence these perceptions.

There is a general absence of information on IWT adoption by FSL teachers. Researchers (SMART technologies, 2006; Smith et al., 2005; Kennewell & Beauchamp, 2007; Smith et al., 2005; Tate, 2002; Solvie, 2004; Moss et al., 2007) have called for further collection of empirical evidence to better understand the processes of teaching and learning with IWT. This need for further evidence provides a strong rationale for conducting this study and for contextualizing it within the field of French as a Second Language and Davis' (1989) TAM. In Chapter 3, the reviewed literature will be connected to the methodological design of this study. The methods used for data collection and analysis will also be explained.

CHAPTER THREE

METHODOLOGY

This chapter consists of four sections. The first section delineates the mixed methods approach used and gives an overview of the research design employed in this study. The second section outlines the methods used in the survey part of the study by describing the questionnaire design, outcome measures, data collection, and data analysis procedures. The third section presents the methods used in the interview part of the study by describing participants, interview protocols, interview data collection, and data analysis procedures. The fourth section discusses ethical issues involved in conducting this study.

The Mixed Methods Approach

As a research project design, a mixed method approach was used for its ability to incorporate both qualitative and quantitative data collection techniques. Thus one highly structured short-answer survey questionnaire for data collection and analysis was used with a population of 14 participants (de Vaus, 2002; Johnson & Christensen, 2004). In addition, interviews were used for data collection and analysis with three participants. The interviews acted as a way for participants to refine, extend and explain specific quantitative findings (Creswell, 2009; Silverman, 2006).

Creswell et al. (2003) stated that a mixed methods study "involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of the study" (p. 212). This mix of both quantitative and qualitative data lends itself to the integration or to the comparison of the

two data sets. From this, an analysis of findings can occur by revealing consistencies, inconsistencies or contradictions. It is with such discussion that construction of possible explanations can occur (Creswell, 2009).

This study was guided by a particular mixed methods design – the sequential explanatory design (Creswell, 2009). This design consists of applying the methods one after another. Creswell and Clark (2007) explain that this design begins with "quantitative data collection and analysis, connecting from the quantitative results to a qualitative phase, and using the qualitative data collection and results to follow up or explain the initial quantitative results" (p. 377). According to Creswell (2009), there is much strength to this design including its straight forward nature and implementation. The steps in the sequential explanatory design fall into clear separate stages leading to easy description and to easy reporting.

A mixed methods approach has several advantages over a single approach design (Teddlie & Tashakkori, 2003). First, mixed methods research provides a stronger understanding of both quantitative and qualitative results and of how they complement one another. Yauch and Steudel (2003) explain that this complementarity in a mixed methods approach is useful "for cross-validation when multiple methods produce comparable data" (p.466). For example, supplementing the questionnaire survey with an interview component can add strength to research data, as post-stage interviews can offer useful explanations for quantitative findings (Kendall, 2008). Second, when mixing different types of research methods the study development is strengthened because it now offers the researcher different perspectives when examining the data collected. This helps

the research project develop, as often "the results from one method... help develop or inform the other method" (Greene et al., 1989, p.259). For example, a follow-up interview to a questionnaire can contribute to the researcher's overall understanding of the issue beyond the statistical findings. Moreover, this approach allows researcher and participant to provide further clarification as well as additional information (Hesse-Biber, 2010).

Quantitative methods produce data that lend themselves well to statistical analyses of reliability and validity; qualitative methods produce data that can add understanding of research results as well as explain the prevailing or inconsistent themes found. When these two methods are combined, the words and narrative of the qualitative data add meaning to numbers (Johnson & Onwuegbuzie, 2004). Having acknowledged the advantages of the mixed methods approach, it is fair to note that researchers have recognized some disadvantages as well. For example, the researcher must be familiar with both quantitative and qualitative forms of research or has to work as part of a research team. Furthermore, the collection of data and the analytical process of combining two data sets can be time consuming and expensive. Such limitations may lead researchers who are constrained by time and money to reduce sample sizes or limit the time spent interviewing. In addition, the theoretical foundation of the mixed methods approach is still being contested, and some methodologists argue that researchers should always work within either a qualitative or a quantitative method, not both (Johnson & Onwuegbuzie, 2004). Despite these limitations, a mixed methods approach was deemed the most suitable approach in conducting this study thanks to its numerous pragmatic advantages.

The following diagram (see Figure 1) outlines the mixed methods data collection and analysis procedures (Creswell, 2009). A detailed explanation of the methods used for the survey and for interviews are provided separately in the next sections.

Quantitative Data Collection

FSL Teachers complete questionnaire

↓

Quantitaive Data Analysis

Analysis of participant responses on questionnaire

↓

Qualitative Data Collections

3 FSL teachers are interviewed

↓

Qualitative Data Analysis

Interview transcripts are analysed

↓

Interpretation of entire analysis
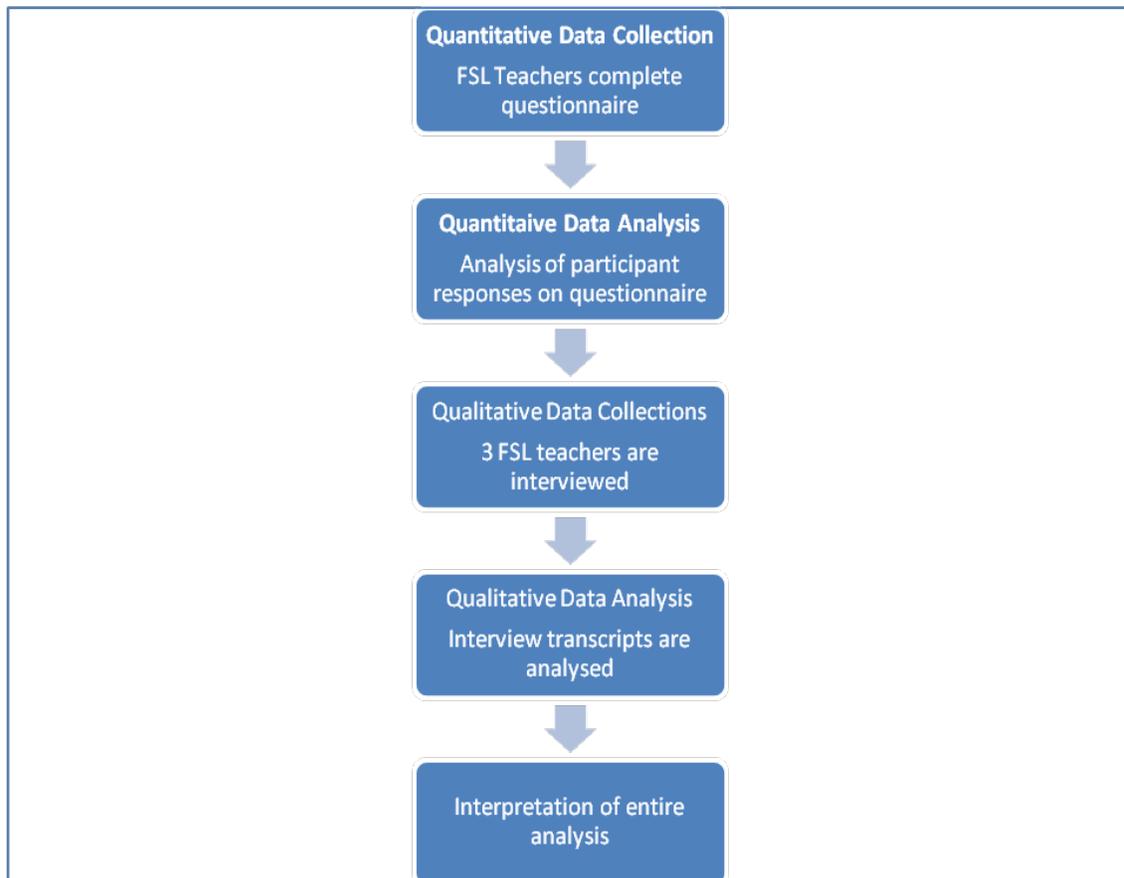
Figure 5 Mix Methods Research Design for the Study (adapted from Creswell, 2009)

Research Method

Site Selection

This study was conducted in Eastern Ontario. This location was selected because I was familiar with the two school boards in the area. I was familiar with the school boards' websites and from them I was able to compile a list of 105 schools. For each individual school a contact email address was made publicly available and no permission

was necessary. Lastly, I limited my participant recruitment to these two school boards because ultimately I would be interviewing the participants and a larger recruitment area would not be manageable due to time and financial constraints.

Participant Recruitment

I sent a participant recruitment email to each school made to the attention of the school's FSL teacher(s) (see Appendix A). Attached to this email was a Letter of Information and a link to an online survey (Appendix B). I chose to administer an online survey because I could reach many individuals in a short period of time. It was also cost effective in comparison to mailing or delivering hard copies of questionnaires. In addition, in accordance with my research topic, I sought individuals who were interested in the research topic and would volunteer reliable information by way of quick response, like the online survey. In a way, my method of recruiting ended up in self-selection of interested people.

Methods for Survey

Survey research was the beginning of the data collection procedure for this study. Surveys are designed to gather the characteristics of a target population from the answers provided by a sample of respondents (Fowler, 2009). The purpose of this survey research was to generalize results from a sample of FSL teachers in two school boards in Eastern Ontario to a population of FSL teachers so that connections could be made about FSL teachers' perceptions and attitudes towards IWT use. The survey method was preferred because it was economical to the researcher and rapidly produced hard data (Fowler, 2009).

Questionnaire Design

In this study, a number of validated items were used to make the theoretical

constructs of the Technology Acceptance Model (TAM) functional and were in principle

adopted from prior TAM research questionnaires of Davis (1993), Venkatesh (2000) and

Venkatesh and Davis (2000). The questionnaire was revised for use in the IWT context

and collected data from FSL teachers. The questionnaire, using a structured format,

consisted of five parts. Section I elicited participant-related demographic information.

The demographic characteristics involved age, gender, total years of teaching experience

(FSL or other), years of FSL teaching experience only, current or most recent school

board affiliation, and the city in which the participants work. Section II consisted of

questions concerning external factors such as the participants experience with and access

to IWT. Section III elicited opinions of participants' perceptions and attitudes towards

IWT use. Section IV asked participants to identify some of the external factors that

personally influence their perceptions of and attitudes towards IWT use. Lastly, section V

asked participants to respond with their initial thoughts, feelings, concerns and attitudes

towards a fictitious scenario that they had to read. Sections II and III consisted of

multiple items that were measured on a seven-point Likert-type scale, ranging from

"extremely likely" to "extremely unlikely" or "extremely good" to "extremely bad" or

"strongly like" to "extremely dislike" or "extremely good" to "extremely foolish"

depending on the question being asked. Participants were also given the option to pass if

they did not want to answer the question. Sections IV and V allowed participants to share

their response in sentence form.

Data Collection Procedures

Ethical clearance from Queen's University was obtained before consent from the participants was obtained (see Appendix C). I issued the questionnaire (see Appendix D – sample questions) to FSL teachers Grades 4-12 employed by two school boards in Eastern Ontario by way of email to individual school email addresses as publicly posted on their school websites. FSL teachers were provided with a Letter of Information regarding the survey (see Appendix B). If they were interested and decided to participate in the questionnaire survey they were directed to the website hosting the questionnaire. A total of 105 schools were contacted, 14 responses were received and all 14 questionnaires were completed and useable for analysis. The total sample for the survey in this study thus consists of 14 FSL teachers.

Data Analysis Procedures

In order to describe the findings from the online questionnaire, each question was analysed using descriptive statistics. Descriptive statistic analysis was used to summarize, reduce, and organize the questionnaire data (McMillan & Schumacher, 2006). Inferential statistic analysis was not used in the process as I did not reach any conclusions that extended beyond the questionnaire data.

In sections I and II, the closed form answers from the demographic information as well as 'the participants' past experience with IWT use' data were analysed using a straight count and reported in frequencies and percentages. In section III, responses were given by way of two 7 point Likert scales. According to McMillan and Schumacher (2006), Likert-type scales are valuable to researchers attempting to assess beliefs or opinions. From this, the responses were ranked according to a rating average with the

categories of "extremely likely" and "extremely good" given the most weight. These findings are presented in Chapter 4. The open-form question of section IV allowed participants to state any influential external factors. These responses have also been analysed using a straight count and reported in frequencies as well as percentages as there were often similar data given by the participants. The open-form question of Section V as well as the additional comments participants left throughout the questionnaire provided additional qualitative insights which appear in the discussion in Chapter 5.

<h3 style="text-align:center">Method for Interviews</h3>

The purpose of the interviews was to qualify the quantitative data. In order to investigate the quantitative findings from the questionnaire, qualitative interviews were held with FSL teachers in order to clarify, expand and provide new information (Creswell, 2009). The qualitative method of interviewing was chosen because it allowed the researcher to have direct contact with the participants. Interviewing is presumed to be appropriate and effective for hearing the experiences behind a participant's opinion. The interviewer can pursue questioning in order to gather in-depth information around the topic (McNamara, 1999). In addition, the interview method was a supplementary part of the data collection procedure for this study because the qualitative interviews were used to support the results from the TAM based questionnaire (McNamara, 1999; Kendall, 2008).

This section describes the research method employed in the interviews. Three participants were interviewed in an attempt to explore their perceptions of and attitudes

towards IWT use as well as to identify any external factors that influence their perceptions of and attitudes towards ITW use.

Participants

In the last section of the questionnaire, participants were asked if they would like to contribute more to the research project by participating in a one-on-one interview either on the phone or in person. If they were interested, they were asked to provide their contact information. Anyone who volunteered would be interviewed. From the 14 completed questionnaires, 3 participants volunteered to be interviewed. All of the interviewees were female FSL teachers. Two of the interviewees had experience with IWT, one had none.

To facilitate interview data discussion, pseudonyms were given to these 3 interviewees that linked them to their interview transcript. Transcripts were labelled A, B and C and to simplify discussion names were chosen to be associated with those letters, Anna, Beth and Catharine.

Interview Participant Profile

Anna.

Anna is in her third year of teaching FSL at the intermediate and secondary levels. She has had some experience teaching FSL with IWT, though at the time of the interview she was not using IWT in her teaching. Anna has never received any professional development training pertaining to IWT use. What she knows about its use she has taught herself.

Beth.

Beth is in her second year of teaching FSL at the junior and intermediate levels. She has no experience teaching using IWT though considers she is computer literate. Beth has never attended a workshop or seminar regarding IWT use.

Catharine.

Catharine is in her 11th year of teaching FSL at the intermediate and secondary levels. She recently returned to teaching from maternity leave to find an interactive whiteboard installed in her FSL classroom. Catharine has not had the opportunity to learn how to use IWT and has taught herself what she knows how to do with the technology.

Interview Protocols

The interview was developed with the intention of eliciting responses from the participants. The interview encouraged the researcher to better understand the participants by allowing them to describe their perceptions and attitudes. These elicitation techniques included developing a semi-structured interview protocol to maintain the consistency of the interview process (Fontana & Frey, 2000; Wengraf, 2001). The interview protocol included four sections. I began with a brief introduction of who I was and what the study involved. The second and third sections contained interview questions based on the TAM in relation to IWT use. These questions focused on 1) general understanding of IWT use, 2) perceived usefulness, 3) perceived ease of use, 4) attitude towards IWT use and 5) the external factors that influence perception and attitude. For example, a question regarding "perceived usefulness" was: "How do you perceive interactive whiteboard use for the FSL classroom?" (see Appendix E – sample interview

questions). In the fourth section, I asked two closing questions phrased as "Do you have anything else you'd like to add?" and "Can you be contacted at a later date if response clarification is needed?" This allowed the participants to speak freely on any areas that the interview questions had not addressed as well as allow for member checking of portions of the interview transcript if by chance I needed further clarification. Furthermore, in order to ensure response accuracy, I restated or summarized the information given by the participant as well as rephrased the questions for clarification when necessary.

Interview Data Collection Procedure

The 3 interviewees were contacted by email to invite them to participate in a one-on-one, face-to-face interview in the afternoons of June 23rd, June 24th and June 25th. The interviews took place in a location of the interviewees' choice either in their classroom or their home. The interviewees were given a Letter of Information (specific for the interview) (see Appendix F) and a Consent Form (see Appendix G) and were told that confidentiality would be assured, that they could withdraw at any time and ask for any information they gave to be withdrawn. After they signed the Consent Form and gave permission to digitally record the conversation, the interviews started, usually lasting for 35-60 minutes for each interviewee. The interviews were all conducted in English.

Interview Data Analysis Procedures

Transcription

First, to organize and prepare the data for analysis, I transcribed the interviews verbatim.

Next, I re-listened to each recorded interview while simultaneously correcting errors

within the transcript. This process enhanced transcript trustworthiness as it limited

misinterpretations. I also refrained from editing the transcript and included pauses in

speech, exclamations and laughter (See part of interview transcript, Appendix H).

Notes

After transcribing the recorded interview, I read over each transcript to gain a

general sense of the information and to reflect on its overall meaning. I made quick notes

in the margins, circled key points and marked points that I found as potentially interesting

or as relevant analytic material.

Developing a Coding Scheme

Qualitative analysis is defined as "a relatively systematic process of coding,

categorizing, and interpreting data to provide explanations of a single phenomenon"

(McMillan & Schumacher, 2006, p. 346). As I was interested in studying the participants'

PU of IWT, PEU of IWT, attitude towards IWT use and the external factors that

influence their perceptions and attitudes, the unit of analysis was an utterance by a

participant. I analyzed the participants' answers to my questions and coded them as one

of four categories based on the TAM: PU of IWT, PEU of IWT, attitude towards IWT

use and the external factors that influence their perceptions and attitudes.

Content Analysis

After developing a coding scheme, I once again reread the interview transcripts. When a data segment corresponded to the coding category it was highlighted in a particular colour. Passages highlighted in orange coded the utterance as one that depicted the participants' PU of IWT. Passages highlighted in blue coded the utterance as one that depicted the participants' PEU of IWT. Passages highlighted in purple coded the utterance as one that depicted the participants' attitude towards IWT use. Passages highlighted in green coded the utterance as one that depicted external factors named by the participants that influenced their perceptions and attitudes towards IWT use.

Trustworthiness of Qualitative Data Analysis

Researchers in qualitative inquiries maintain that the researcher is the primary instrument in data collection (e.g., Locke et al., 2000; Patton, 2002). It was evident through administering the questionnaire and conducting the interviews, that I as researcher was the primary instrument used in the data collecting process. As an FSL teacher with an undergraduate degree in French, I have worked with many FSL teachers and have a personal interest in IWT use for second language learning as well as experience in using it in a variety of contexts. This past spring, I have attended two workshops on the subject of IWT for second language learning to further my knowledge on the topic and how the tool is used and understood by FSL teachers. This sensitivity, according to Strauss and Corbin (1990), refers to the researcher's skill and ability to understand and give meaning to the subtleties of the data. Furthermore, I feel that my educational background and experiences as an FSL teacher knowledgeable in IWT use

only adds to the trustworthiness of this study. Patton (2002) considers the researcher's perspective important and suggests that it can add credibility to the research. Strauss and Corbin (1998) further pointed out that a researcher's experience and knowledge are what sensitizes the researcher to significant problems and issues in the data and allows the researcher to seek explanations for alternatives and to theorize emergent concepts.

Ethical Issues

Ethical clearance for the study was obtained from both the Education Research Ethics Board and the Graduate Research Ethics Board of Queen's University (See letter in Appendix B). Since there were no sensitive/personal questions in the questionnaire or interviews, no ethical concerns were identified in completing either the survey questionnaire or the interviews. No psychological, emotional, economic, cultural, and/or social risk was foreseen for the participants. Survey participants were given a Letter of Information and a Letter of Consent. Interview participants were given a second Letter of Information and Letter of Consent specifically designed for the interviews. Informal briefing of the study was conducted before the interview in order to ensure that the interviewee recognized who I was and understood the nature and purpose of the study. Furthermore, questionnaire and interview participation was voluntary. The participants were also given the option to pass on any question and were informed that they may end the questionnaire or interview and may withdraw at any time. The participants were informed that they may request the removal of all or part of their data. The participants of the survey and the interview were assured that their responses to the questionnaire or the interview would not be released to anyone without their consent and that their responses would be used only for the stated research purposes. The participants were informed that

if the researcher intends to publish the findings or report them at conferences their

identity would not be disclosed and if necessary a pseudonym would be assigned to their

data. Prior to any sort of participation, the participants were assured that confidentiality

would be taken seriously by following the guidelines of both the Education Research

Ethics Board (EREB) and Graduate Research Ethics Board (GREB) of Queen's

University.

CHAPTER FOUR

QUESTIONNAIRE AND INTERVIEW FINDINGS

Introduction

The purpose of this study was to understand FSL teacher's perceptions and attitudes towards IWT use and to identify the external factors that shape them. The data presented in the following chapters begin with the findings derived from the online questionnaire and are followed by findings derived from interviews with three of these FSL teachers.

In the first section, descriptive statistics are used to describe the data from the online questionnaire. The data has been organized in four subsections (a) demographic information (b) experience using IWT (c) perceptions and attitudes towards IWT use and (d) influential external factors. In the second section , the findings from the interview transcripts will be presented. These findings are presented in four key areas that emerged from the data. They are presented in the four subsections (a) influential external factors (b) perceived usefulness (c) perceived ease of use and (d) attitude towards IWT use. The findings presented in each of these sections will be discussed in Chapter 5.

Questionnaire Findings

Demographic Information

The majority of participants were female, between the ages of 31-40 years, had 11+ years of teaching experience and had 11+ years of FSL teaching experience. Of the 14 questionnaires completed online by FSL teachers, nine (64.3%) were completed by female teachers and five (35.7%) by male teachers. Of these 14 teachers, four (28.6%) were between the ages of 20-30 years, six (42.9%) were between the ages of 31-40 years,

2 (14.3%) were between the ages of 41-50 years and two (14.3%) were between the ages of 51-60 years. None of the participants were over the age of 61 years, and none of the participants passed on answering this question on age.

All of the questionnaire participants were FSL teachers. Regarding the 14 teachers' years of teaching experience (FSL and other), two (14.3%) were currently in their first year, three (21.4%) had 2-10 years experience, seven (50.0%) had been teaching 11-19 years, and four (14.3%) had been teaching 20-28 years. None of the participants has taught 29 years or more, and none of the participants passed on answering this question. Of the 14 teachers' years of FSL teaching experience only, two (14.3%) were in their first year of teaching FSL, three (21.4%) had taught FSL for 2-10 years, eight (57.1%) had taught FSL for 11-19 years, and one (7.1%) had taught FSL for 20-28 years. None of the participants had taught FSL for 29 years or more, and none of the participants passed on answering this question.

Prior Experience with IWT

At the time the questionnaire was answered, the majority of the participants taught in schools that had classrooms equipped with IWT; however; the majority of the participants had never used IWT nor had IWT in their classroom. None of the participants had attended a professional development workshop devoted to IWT use in the FSL classroom. Of the 14 participants, 13 (92.9%) worked in a school where there were classrooms with IWT, and 1 (7.1%) did not. None of the participants answered "I don't know" nor passed on this question. In their teaching overall (of any teaching subject area), 11 (78.6%) participants had never used IWT and three (21.4%) had. None of the participants passed on this question. At the time of the questionnaire, 13 (92.9%) of

the 14 participants were not using IWT in their FSL classroom, one was. None of the participants passed on this question. Of the 14 participants, all 14 (100%) had never attended a professional development workshop devoted to IWT use in the FSL classroom.

Perceptions and Attitudes towards IWT Usefulness and Ease of Use

Prior to this study, no previous study has been conducted implementing the TAM to understand FSL teachers' perceptions of and attitudes towards IWT usefulness and ease of use. Therefore this section of the questionnaire presented elements that were generated based on Davis' (1998) TAM conceptual framework and definitions presented in earlier chapters. The questionnaire presented participants with ten statements that were in random order on a seven-point Likert scale. The participants were asked to indicate the degree of likeliness/goodness that they felt when reading the statement. All 14 of the questionnaire participants provided an answer to all ten statements. The results of the responses to these statements are shown in Table 1.

Given that the purpose of this study was to explore FSL teachers' perceptions of and attitudes towards IWT use, participants were given the opportunity to comment on each of the statements. They were prompted with the statement "I feel this way because…" and were given a box to type any further information. These responses were coded in the same way as the interview transcripts and will be discussed in Chapter 5.

Influential External Factors

In order not to limit participants to particular influential external factors, they were provided with an open-frame question "What are some of the external factors that

	Extremely Unlikely	Quite Unlikely	Slightly Unlikely	Indifferent	Slightly Likely	Quite Likely	Extremely Likely
1. I find/would find using IWT easy.	0.0	0.0	7.1	0.0	14.3	71.4	7.1
2. Using IWT improves/would improve my performance as a FSL teacher.	0.0	0.0	7.1	21.4	28.6	42.9	0.0
3. I use/intend to use IWT when/if it is available.	0.0	0.0	7.1	0.0	21.4	35.7	35.7
4. IWT is/would be easy for me to use.	0.0	0.0	0.0	7.1	21.4	71.4	0.0
5. Using IWT enhances/would enhance my students' language learning environment.	0.0	0.0	0.0	7.1	35.7	50.0	7.1
6. Using IWT increases/would increase the quality of my lesson planning.	0.0	0.0	7.1	28.6	28.6	28.6	7.1
	Extremely Dislike	Dislike	Slightly Dislike	Am Indifferent to	Slightly Like	Like	Strongly Like
7. I ___the idea of using IWT for FSL teaching and learning.	0.0	0.0	0.0	14.3	14.3	35.7	35.7
	Extremely Foolish	Quite Foolish	Slightly Foolish	Neither Foolish nor Good	Slightly Good	Quite Good	Extremely Good
8. Using IWT in the FSL classroom is a(n) ___idea.	0.0	0.0	0.0	7.1	35.7	35.7	21.4
9. Using IWT would be ___ for second language learning.	0.0	0.0	0.0	7.1	7.1	57.1	28.6
10. Using IWT in FSL teaching and learning is an overall ___idea.	0.0	0.0	0.0	0.0	21.4	50.0	28.6

TABLE 1 – Questionnaire Responses

influence your perceptions and attitudes toward IWT use?" Of the 14 participants six answered this question. The majority of the participants named similar influential external factors. Of the above six participants, three named lack of knowledge and training on IWT use as a factor that influenced how they perceived IWT use. Two of the above six participants specified that they were unaware of how IWT could be used specifically in the FSL classroom for second language learning. Five of these participants commented that the cost of IWT influences their perception of IWT use. Two of the six participants commented that their school or school board as well as what they heard about IWT use from their colleagues were influential external factors. Only one of these commented on personal lack of computer skills as an influential external factor.

Interview Findings

Of the 14 questionnaire participants, three provided me with contact information and volunteered to participate in a one-on-one face-to-face interview. Like the questionnaire, the interview questions were formulated based on the TAM. All three participants answered every question they were asked and the data from their responses were categorized by (a) influential external factors (b) perceived usefulness (c) perceived ease of use and (d) attitude towards IWT use and will be presented in the figures below that illustrate the modified TAM model used in this study. Each figure represents one of the interview participants identified by assigned pseudonym. The numbers given stand for the interview question from which the data was drawn. The specific themes of each category will be discussed further in Chapter 5.

Influential External Factors

-Lack of training on how to use IWT (4, 5, 6, 9)

-Time (8, 9)

-Personal experience with computers (8)

-School/School Board (9)

-Money (9)

-Other teachers' attitudes towards IWT use (10)

-Pressure to teach with technology (9)

Anna: Perceived Usefulness of IWT

-as a multipurpose tool (1, 2, 11)

- as an interactive tool (2)

- as appealing to students (11, 12

- as a motivational tool for students (7, 10)

-as a means to engage students (7, 11)

-as a way to create lesson plans (3)

Anna's Attitude towards IWT use is expressed as

- very useful (10)

-students would like it (1)

-as a cool board thing (7)

Anna: Perceived Ease of IWT Use

-as a fairly easy tool to use (8)

-as a tool that would lead to less printing and photocopying (3)

-as a difficult tool to use to its maximum potential (4)

Figure 6 *Anna – Modified Technology Acceptance Model*

Influential External Factors

-Lack of training on how to use IWT (4, 5, 6, 10)

-Personal experience with computers (4, 8)

-School/School Board (9)

-Money (9)

-School environment (9)

-Pressure to teach with technology (9, 12)

Beth: Perceived Usefulness of IWT

- as an interactive tool (2, 3, 10)

- as appealing to students (11)

- as a motivational tool for students (7, 10)

-as a means to engage students (2, 7)

-as a way to create lesson plans (3)

Beth's Attitude towards IWT use is expressed as

- a positive attitude

-fun

-interesting

Beth: Perceived Ease of IWT Use

-as a fairly easy tool to use (8, 12)

-as a way to save time (3)

-as convenient (12)

-as a difficult tool to use to its maximum potential (4)

Figure 7 Beth – Modified Technology Acceptance Model

Influential External Factors

-Lack of training on how to use IWT (4, 6)

-Time (6)

-Personal experience with computers (4)

-School/School Board (9)

- Other teachers' attitudes towards IWT use (9)

--Pressure to teach with technology (7)

Catharine: Perceived Usefulness of IWT

-as a multipurpose tool (7, 10)

- as an interactive tool (5)

- as appealing to students (7, 11)

-as a way to create lesson plans (3)

-as a way to improve her organization (3)

- as a way to improve her classroom's atmosphere

Catharine: Perceived Ease of IWT Use

-as a fairly easy tool to use (8, 10, 12)

-as simple (3, 10)

-as convenient (10)

-as a tool that would lead to less printing and photocopying (3)

-as a difficult tool to use to its maximum potential (4, 12)

-as an easy tool for students to use

Catharine's Attitude towards IWT use is expressed as

-my favourite thing

-exciting

-frustrating when technical difficulties occur

-time consuming when learning how to use IWT
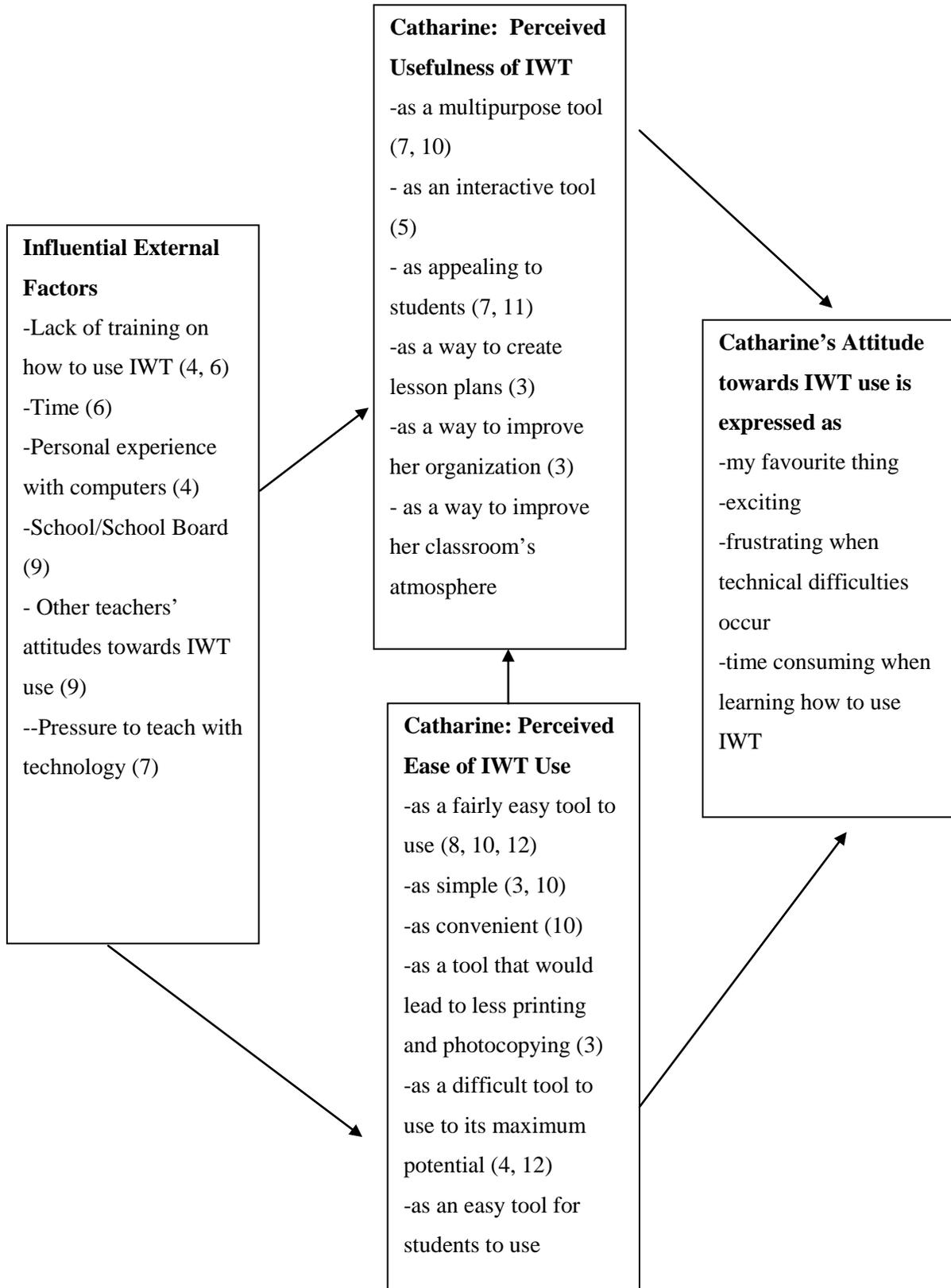
Figure 8 Catharine Modified Technology Acceptance Model

Summary

In this chapter I have presented the quantitative questionnaire data and the interview data specific to each interview participant. In the following chapter, I present the core themes that emerged from the qualitative responses to the questionnaire and the individual interviews and discuss them in relation to the literature reviewed in Chapter 2. Included in this discussion, an interpretation of my entire analysis, both quantitative and qualitative.

CHAPTER FIVE

DISCUSSION OF THE RESEARCH FINDINGS

Introduction

The purpose of this study was to explore French as Second Language (FSL) teachers' perceived usefulness (PU), perceived ease of use (PEU), the external factors that shape these perceptions and their attitudes towards Interactive Whiteboard Technology (IWT) use by applying the TAM (Technology Acceptance Model) (modified and adopted from Davis, 1989) framework. Through a mixed-methods study I conducted both a survey and interviews in my investigation which offered insight into the examined research questions:

1. How do FSL teachers perceive IWT usefulness?

2. How do FSL teachers perceive the ease of IWT use?

3. What are the attitudes that influence how FSL teachers' perceive IWT usefulness as well as how they perceive the ease of IWT use?

4. What external factors do FSL teachers identify as influential towards how they perceive IWT usefulness as well as how they perceive the ease of IWT use?

All four of these questions are addressed by the findings of both the survey and the interviews. Findings are categorized into four major conclusions, with the first two conclusions addressing the first question, the third addressing the second and fourth questions, the fourth conclusion addressing the third and fourth questions. The

coding throughout stands for the question number (Q#) followed by the questionnaire

respondent number (R#) or the interviewee's first initial (A, B, or C).

In general, the results of the study supported the following conclusions: 1) FSL

teachers perceived IWT use as a way to enrich FSL instruction; 2) FSL teachers

perceived IWT use as a way to enrich FSL learning; 3) FSL teachers perceived IWT easy

to use if the necessary training was given on how to use IWT to its optimal potential; 4)

FSL teachers had mixed attitudes towards the use of IWT in the FSL classroom. Lastly,

due to the nature of the open-ended framed questionnaire and semi-structured interviews,

there were certain additional findings that are worth mentioning; however, these do not

necessarily fit in with these four conclusions. Questions related to these additional

findings will be addressed at the end of this chapter.

In accordance with Creswell's model (see page 53) in my discussion of findings I

proceed with an interpretation of my entire analysis including both quantitative and

qualitative findings.

As is obvious by examining Table 1 on page 68 the results of the questionnaire,

the quantitative portion of my study, show overall positive reactions to IWT. Referring to

the entries on a Likert scale from 1 to 7 measuring increasingly positive responses,

questionnaire responses were overall mostly at 6 or 7 on the scale. A group was slightly

indifferent to slightly negative. Discounting the slightly 'unlikely' one still notes a certain

indifference but not negativity. Given the fact that the participants who were recruited

had to be familiar enough with the technology to participate and be able to answer the

question, these answers confer validity to the findings. In the following discussion of the findings the entire analysis of data is taken into account.

Enriching FSL Teaching

Supporting lesson planning and creating materials

Teachers who use IWT find IWT use motivating because it can provide them with easy access to digital materials and enrich their lesson plans (Zadelhoff, 2007; Balanskat et al., 2004). My participants found that this accessibility facilitates lesson planning and delivery:

> An interactive whiteboard allows you to access materials that you otherwise would not be able to show the students as a whole class. […] You can prepare lessons for use with the whiteboard and you can save them and use them in another class, at another time (Q3A).

> I would hope that it would make my lesson planning easier and that I could re-use materials in other grades – I mean when I prepare a game with say, trivia cards, the cards get all destroyed after one use and can't be reused…if it was an interactive game on the screen everyone could play and no material would be destroyed (Q3B).

Although it can take time to prepare lessons with IWT and to become comfortable using the technology (Glover & Miller 2001; Greenwell 2002; Levy 2002; Ball 2003), Lee and Boyle (2003) found that teachers felt that planning time should eventually be reduced given the facility of IWB technology to save, share and re-use lesson materials. Catharine comments on the French teachers in her school who use IWT and share resources:

> "…last time someone taught [the applied French course] they put the entire [course] on our sharing files site. Every time one of us goes on it, it's there. It just doesn't make sense for all of us to be creating the exact same stuff, now we just share. (Q11C)

Teachers are also able to access a wide range of materials on-line and can present content in an interactive and in a visually pleasing way.

Access to material

Consistent with earlier studies (Beeland, 2001; Beauchamp & Parkinson, 2005; Morgan, 2008), the engagement and motivational value of IWT use was a recurring theme. Teachers reflected on how much today's students use and like using technology and how incorporating technology in FSL engages them:

> I think [IWT] can be used to get the students to like French class […] I know that students nowadays are just eating up technology. A SMARTboard™ instantly gets their attention and they think, "Oh yeah, in French class we get to play with that cool board thing", maybe. (Q7A)

> I mean in our society right now, considering how much computers are affecting our lives, especially those of our students, it's an opportunity to incorporate that (Q7C).

As noted by Miller et al. (2005), IWT has credibility for students, in that it is a similar medium to that used and watched by them in their everyday lives.

Student engagement is echoed by Beauchamp and Parkinson (2005). IWT "is a lot more exciting than the blackboard and overhead projector, and [students] will be curious to find out about its functions and capabilities. As a result they pay more attention than in the past" (p.97). Referring back to the TAM and PU of IWT for the FSL, interview participant, Beth, comments:

> It's hard to get the kids up and moving and engaged in French class. I guess it is my understanding that [IWT] could help with interactive lessons and engaging the students (Q2B).

Furthermore, teachers have noticed that learners are more engaged because the board is large and the contents clearly visible (Zadelhoff, 2007; Balanskat et al. 2004). Catharine commented that it is this visual aspect that captures her students' attention:

> It's an opportunity to use PowerPoint presentations and to incorporate a more visual presentation of material. It's neater (pause) very visually pleasing.[…] It's nice to look at. I can add pictures, look up websites.

According to Cunningham et al. (2003), it is the visual aspect of IWT that keeps students on task. Everyone in the class is more attentive, and the screen is big enough for everyone to see.

The notion of increased student engagement and motivation when using IWT in a learning environment is developed by Tate (2002), who finds that students in the technology-enhanced classes reported more enthusiasm and interest in the content than did the students in traditional classes.

Interactivity

Smith, Higgins, Wall and Miller (2005) argue that the interactive potential of IWT in particular offers opportunities to create educational added value. This argument is supported by other researchers such as Bell (2000), Becta (2003), Glover and Miller (2001) and Greiffenhagen (2000). Becta (2003) states that students are motivated in lessons with an IWB because of 'the high level of interaction – students enjoy interacting physically with the board, manipulating text and images'(p.3). However, despite studies that found students to be eager to interact with the board, evidence from research suggests that not all teachers are involving pupils to this extent (Bell, 2001; Levy, 2002).

Catharine comments that students writing down their answers on the board slows down

her teaching pace:

> "It can be quite time consuming because you can only have one [student] up there at a time whereas on a chalkboard you can have 10 to 15 kids up writing. So if I have kids up there writing, it will take a good chunk of time" (Q5C).

Because this study is from the perspective of the FSL teacher, it is difficult to evaluate

the FSL student's perception of the IWT element of interactivity. If interacting with the

whiteboard slowed down the teacher's pace, it would be up to the teacher to modify the

lesson to allow for this interactivity to take place.

Interacting with the whiteboard is only one type of interaction that is taking place

in the IWT learning environment: students interact with other students. In Levy's study

(2002) students reported that sharing their work with others in the class helped them to

articulate their ideas and give explanations. The students are also interacting with the

teacher. Levy (2002) notes that IWT was felt by some teachers to enhance teacher–pupil

interaction, 'by encouraging students to offer answers to questions, which if correct can

be noted on a flipchart' and was supported by the 'the strong visual and conceptual

appeal of the information and learning resources that are displayed' (p. 8). This

interaction between student and teacher is echoed by Anna's comment that when using

IWT "we do activities together on the screen" (Q11A).

.Learning styles including special needs

One of the elements of added educational value is the support that IWT lends to

students with various learning styles and students with special needs (Bell, 2002; Cuthell,

2003; Burden & Sientniekas, 2004; Glover, 2007). Teachers are continuously developing

and adopting strategies and tools that will reach students with unique or diverse learning

needs. IWT lends itself to accommodating many of these learning styles when used in

lesson delivery and learning activities (Table 2, adopted from SMART technologies,

2006). Technical features include the possibility to combine images, text and sound and

the support for tactile activities such as drag-and-drop contribute to the processing of

information (Salinitri & Smith, 2002; Carter, 2002; Sessmons, 2007) and concentration.

In FSL learning Anna and Catharine comment on how IWT can be used by visual and

kinesthetic learners:

> I think that [IWT] I best used for teaching French because students can physically manipulate the language. If we're doing a grammar lesson, I can make an interactive worksheet that the students can see on the whiteboard. Then they can move the words around until they can make a correct sentence structure, or something like that (Q2A).

> When you're learning a second language being able to see, for example, structurally when you're looking at a sentence that has a direct object noun in it, and having to replace that with a direct object pronoun, using IWT would make it easier to see that visually. On a whiteboard it is easier to see than on a chalk board, and neater. Penmanship and legibility issues aren't a factor. Being able to highlight keywords is good. I can also show French movies on the screen (Q2C).

Kinds of learners	IWT use
Visual	-notes written on interactive whiteboard -notes typed on the interactive whiteboard using a variety of fonts, colours, highlighters and text sizes -diagramming, clip art pictures, videos, symbols -enables students to see their own writing and objects of their own creation
Kinesthetic/Tactile	-learning activities involving touch, movement and space -use of the boards touch screen, pens, and touch sensitive keyboard
Deaf/Hearing-impaired	-See Visual -facilitates the presentation of visual material with the use of sign language simultaneously in front of students
Visually impaired (with some vision)	-can manipulate objects and use large text -can participate in computer based learning that would otherwise be difficult on a smaller computer screen -learning activities are reinforced using sound bites
Other: learners with other physical disabilities, or behavior issues (i.e., Attention Deficit Disorder)	-large interactive surface facilitates ICT learning beyond the standard keyboard/mouse type of computer interaction -students can use wands instead of fingers to move objects -its appeal can be used to promote good behaviour

Table 2 - Learning Styles and Kinds of Delivery adopted from SMART Technology, 2006.

Need for Training

Many authors (Smith, 2002; Glover & Miller, 2002; Warren, 2002; Smith et al, 2005, Ofsted, 2005) emphasize the importance of good training. As Kennewell and Morgan (2003) note "In order to exploit all the features of these devices whilst interacting with a class, teachers need to develop a number of new techniques to reach automaticity and to gain an understanding of their features in teaching and learning" (p.2). This need for training was the most influential external factor on a teacher's perceived ease of IWT use named by both the questionnaire and interview participants. Neither questionnaire participants nor any of the interview participants had ever received IWT training in any context – teaching FSL or other. In an answer from the questionnaire, one participant comments on this lack of training by saying, "There's no sense giving me this technology, or any teachers for that matter, without the necessary training/ [professional development] to use it effectively" (Q15R1). This importance for training is echoed by Kennewell's (2007) emphasis on initial training and professional development. Kennewell (2007) comments that what a teacher does with IWT is more important than the technology itself. Without the necessary training IWT use will not lead to changes in a teacher's teaching methods or practices. This is evident in the comparative research of Moss et al. (2007) and Higgins et al. (2005) on teaching practices with or without IWT. Their research concluded that in comparing the two methods, no major changes to teaching practices occurred. This lack of change is explained by Higgins (2006), Nordkvelle and Olsen (2005), and Seomekh and Haldane (2006) point to the fact that teachers apply their current teaching styles and practices when they start using IWT resulting in minimum pedagogical growth and frustration. Interview participant,

Catharine, comments on returning from her maternity leave to find an interactive whiteboard installed in her classroom. The teacher filling in for her was given some training on how to use the board, however Catharine was not. She comments:

> I didn't have any training. But I would like to have some because it has taken me more time and I'm not efficient because it's all trial and error, figuring out how to do it. […] I've figured a lot out of it, but I still need someone to teach me how to use it. It's such a fantastic tool that without the training can you really maximize its use? […] I can't say that I'm the most patient when it comes to technology, I get very frustrated, but uh, I have the basic computer skills whereas I know a lot of staff members that are way worse than me … that if they were to get something like this I can just imagine them not wanting to go near it because using the technology would be a major concern (Q4C).

Davis et al. (1989) observed that when users learned to effectively use a tool, the direct effect of ease of use on attitude disappeared. After two studies Davis concluded that "no amount of ease of use can compensate for a system that does not perform a useful function" (p. 333). FSL teachers need training to see how IWT can be used effectively.

Optimal Use

Factors that contribute to effective use of IWT include the availability of adequate training conditions so that teachers can develop self-confidence and can integrate IWT into their educational practice (Levy, 2002; Glover & Miller, 2001). In an answer to the questionnaire, one participant commented on the hypothetical idea of being required to use IWT without training:

> "I wouldn't even know how to turn [the interactive whiteboard] on, let alone use it. I'm sure some of the teachers in the school currently using IWT could help me, but I would be terrified. The last thing a teacher needs is to look like she doesn't know what she's doing in front of her students …"(Q16R2).

Other key external factors that influence effective IWT use include "time" available (Glover et al., 2001, p. 17). Interview participant, Anna, comments "[The school and school board] don't invest the time … needed to provide the training to the teachers" (Q9A). "I think once I was taught how to use [IWT] or had some time to figure it out on my own, I would not find it difficult to use at all" (Q8A).

Other contributing factors to effective IWT use would be adequate access to IWT, sample materials and specific ones to subject training (Glover & Miller, 2002; Agterberg & Teeuwes, 2007). Limited access to IWT was expressed by the 13 of 14 questionnaire participants who were not currently using IWT in their FSL classrooms. One participant commented simply "I don't have access to one" (Q2R2). Another participant who had access to IWT but not using it commented "the SMARTboard™ is not in my classroom…It takes a lot of effort to use it when it's not in your [classroom] because you have to relocate your students or the board…It becomes a hassle for one lesson" (Q2R3). It is clear that FSL teachers are not being given adequate access to IWT. The participants also commented on the materials they use, would use or could use with IWT with some mixed-responses. One questionnaire participant expresses this opinion "I am not too sure what IWT has to offer for language learning and teaching --- or teaching in general. Like, what kinds of organization tools does it have? Classroom management tools?" (Q6R2) and "…I would also wonder what am I supposed to do on the whiteboard? … I would wonder how can I cover curriculum as well. Are there speaking/listening applications, etc…?" (Q16R2). Another writes" "I already enjoy using PowerPoint and going to the computer lab with my students. [IWT] would be another way to access

authentic [FSL] materials for my student" (Q11R4). In order for FSL teachers to effectively use IWT it is clear that they need access to sample materials specific to FSL teaching. Moss et al. (2007) comment that training on how to use IWT should not be based on the assumption that there is a well-defined knowledge amongst FSL teachers of all the possible applications of IWT technical features. FSL teachers need to be shown specific materials for FSL learners. This specificity of training to subject area is mentioned by three questionnaire participants who comment "I would definitely need some training in how to use the board, and specifically how to use it for language teaching" (Q16R4), "To use this technology effectively you need the resources of: training, possible FSL programs provided…"(Q15R1), and regarding IWT training "… a math teacher would use [IWT] in a different way than a French teacher. Training would have to be specific to subject, I guess" (Q15R2). It is clear that the technology itself is not self-explanatory nor can it improve FSL teaching and learning on its own.

The expected added value of IWT use in FSL can only be realized with the knowledge of the teacher. This knowledge is gained through subject specific IWT training opportunities and when time is allowed for teachers to adopt the new technology, these findings are supported by the results from earlier studies (Glover & Miller, 2007; Somekh et al., 2007; Fisser & Gervendink Nijhuis, 2007).

Attitudes towards IWT use

The teachers in this study were very positive about IWT use. According to the modified TAM from Davis (1989) it is the users' beliefs and perceptions about a

technology that influence their attitude towards using it. This positivity is consistent with

some earlier studies (Lee & Boyle, 2003) in which immediate positive reactions were

found to the use of IWT. However, this contrasts with other studies, such as Glover and

Miller (2001) who found substantial variability in teachers' reactions to IWT, and Gatlin

(2004) who reported initial resistance towards IWT use. The ways in which IWT can

enrich FSL teaching and FSL learning seem to be appreciated considerably. The

interview participants perceive IWT use as "innovative" (Q10A), a way to "make French

for [for students] and maybe teach fun too" (Q11B), "exciting" (Q11C), and "a fantastic

tool" (Q4C).

While some disadvantages were voiced occasionally, these were usually placed in

close context with something positive for the technology. For example, Catharine

comments on the technical aspect of IWT saying "9 times out of 10, if I have a small

technical problem, usually one of the students in the class who's very proficient at this

kind of stuff will fix it" (Q11C). Other disadvantages included the installation of the

equipment and how most French teachers do not teach in their own classroom but travel

from class to class. One questionnaire respondent comments on IWT use being a good

idea in the FSL classroom "only if FSL teachers have their own classroom, where they

could use the board for at least a few periods in a row"(Q7R1). Overall, the teachers

share a positive attitude towards IWT use.

Additional Findings

In this section, I will discuss additional findings that emerged from the study but

that did not directly fit into the modified TAM. These additional findings are important

because they contribute to IWT research and give insight into potential areas for further research.

The "other" teachers

Several participants of this study commented on their colleagues' use and access to IWT. Anna remembers, "A couple of years ago, I think the first [interactive whiteboard] was brought into the school for another staff member, but it was one of those things …it's great they have it, but I don't" (Q9C). Seeing others' use IWT but not having direct access to use it was noted in the questionnaire responses as well. "I know a few teachers who use IWT in other subject areas. … If my school were to buy me one, I would most definitely put it to use!" (Q8R2). It is interesting to see these comments because it formulates the question "Why is IWT being used in other classes by other teachers, and not by many FSL teachers?" One questionnaire participant comments on this notion by saying, "if [IWT] is being used in other classrooms and in other subject areas, then why not for FSL? Students that use IWT in their regular classrooms would see more consistency in their day and in their learning if it was used in all subject areas, not all areas but FSL" (Q11R1). These ideas of "consistency" and "all subject areas" warrant further inquiry.

Another time for change

In the literature reviewed in Chapter 2, it is evident that there are numerous ways to teach second language learners and historically, there has been quite an evolution in adoption of FSL teaching tools. Only one interview participant commented on this "change" in FSL instruction. Beth comments:

> I guess the ways we teach French always change, and this is just another time for change. So why not use this kind of technology in the classroom? I mean if the

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right person put together a bunch of materials for teaching French and taught teachers how to use [IWT], it would be pretty easy and probably convenient, depending on how the school board went about it. But ya, it's worth a try (Q12B).

She comments on her attitude towards this change in saying "Every few years French teachers learn a new gimmick to assist them in teaching their students. I'm pretty used to adapting my teaching style to the latest language teaching trend" (Q10B). Beeland (2002) found that this change happens best when the teacher is confident and competent in using the teaching tool. Further research would be required to investigate the influence of new FSL teaching tools on the FSL teacher's teaching style and how this influences the students' second language learning experience.

Limitations of the Study

While this study aimed to explore FSL teachers' perceptions of and attitudes towards IWT use, there were some limitations to this project.

While every effort was made not to influence participants in this study, it was also necessary to find participants who were sufficiently knowledgeable to answer the survey questions. In doing so I could have recruited participants who absolutely hated the technology as well as others on a variable scale of opinions. As it turned out, the participants were mostly favourable to the use of IWT with no doing on my part. Perhaps in the call for participants one could have two groups of participants, those who are favourable and those who are not in order to obtain a wider range of response, although all need to be knowledgeable.

Despite responses of 14 participants to the questionnaire, the fact that only three agreed to be interviewed somewhat limited my study although this small number of

participants provided rich detailed information. Perhaps timing the study at this particular time of year was not conducive to having many teachers volunteering.

Although I made every attempt to ensure the trustworthiness of the study through the various methodological procedures put in place and a neutral attitude, it is uncertain if my enthusiasm for the study and IWT did not somehow influence my way of interviewing participants, my reporting and discussing of findings. Further studies will help elucidate such questions.

This chapter reported on the findings from the questionnaire and interviews, offered additional finding and proposed areas for further research. In the next chapter I provide a short conclusion.

CHAPTER 6

CONCLUDING REMARKS

In the research reported in this project I examined FSL teachers' perceptions of and attitudes towards IWT use. The purpose of this study was to explore the ways in which FSL teachers perceived IWT to be useful, how FSL teachers perceived the ease of IWT (ease of IWT)use, the external factors that shape these perceptions and their attitudes towards IWT use. In order to do so, participants shared their thoughts by way of questionnaire and interview. In the preceding chapter I discussed the data from both the questionnaire and interviews with reference to the literature reviewed in Chapter 2. I also noted additional findings, implications for future research, and the limitations of the study. In this chapter, I offer concluding remarks.

Based on the findings from this study, I concluded that FSL teachers perceived IWT use as a way to enrich FSL instruction by supporting lesson planning, creating materials and providing access to materials. FSL teachers also perceived IWT to enrich FSL learning by engaging and motivating students, by providing an outlet for interactivity and by appealing to various learning styles including students with special needs. Furthermore, FSL teachers perceived IWT easy to use if the necessary training was given on how to use IWT to its optimal potential. Lastly, FSL teachers had mixed attitudes towards the use of IWT in the FSL classroom. The perceptions of use and ease of use of the FSL teachers, who participated in this study, are influenced by external factors that in turn shaped their overall attitude for IWT use.

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APPENDICES

Recruitment Email for Questionnaire Participants

"Interactive Whiteboard Technology:
Perceptions and Attitudes of French as a Second Language Teachers"

My name is Jennifer Lisi, and I am a Master's student at the Faculty of Education at Queen's University, Kingston, Ontario. I am writing to invite you to participate in a research study that I am conducting involving FSL teachers in Kingston and its surrounding areas. I received your email from your school's website.

This research will contribute to my Master's project, under the supervision of Dr. Marie J. Myers that is investigating the perceived usefulness, perceived ease of use and the attitudes of FSL teachers toward interactive whiteboard (e.g., SMARTboard™) use in the FSL classroom.

If you choose to participate you will be invited to complete a short-answer questionnaire online that is comprised of 27 questions and will take approximately 15-30 minutes to complete. All teachers who are currently teaching FSL or who have taught FSL, Grades 4-12, in the past are welcome to participate in the questionnaire.

More information on the nature of the research and your involvement is provided prior to beginning the questionnaire in a letter of information. Please review it careful.

The questionnaire is available at www.surveymonkey.com/iwtsurvey. Please complete the questionnaire before Friday, June 25th, 2010. A second email will be sent to you as a reminder of this opportunity June 20th, 2010.

To access the questionnaire please click the following link

www.surveymonkey.com/iwtsurvey

Thank you for your interest in this study.

Jennifer Lisi, M.Ed. Student

Faculty of Education, Queen's University

Appendix B – Letter of Information for Questionnaire participants

Online Letter of Information for Questionnaire Participants
"Interactive Whiteboard Technology:
Perceptions and Attitudes of French as a Second Language Teachers"

Dear Participant,

My name is Jennifer Lisi, and I am a Master's student at the Faculty of Education at Queen's University, Kingston, Ontario. I am writing to request your participation in a research study that I am conducting. This research will contribute to my Master's project, under the supervision of Dr. Marie J. Myers. This study was granted clearance by the General Research Ethics Board for compliance with the "Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans", and Queen's policies.

The purpose of this study is to explore FSL teachers' perceived use, perceived ease of use and attitudes towards interactive whiteboard use. To do this, I am planning on analyzing questionnaire feedback from FSL teachers in Kingston and its surrounding areas as well as conducting individual interviews with those teachers who wish expand on their questionnaire responses. You are invited to complete an online questionnaire (27 questions, approx. 15-30 minutes in length) about your perceptions and attitudes towards interactive whiteboard (e.g., SMARTboard™) use in FSL teaching and learning. You will also be given the opportunity to add more information by way of semi-structured if you choose to provide your contact information. Your contact information and interview data will not be attached to your questionnaire responses. Data will be secured and confidentiality is guaranteed to the extent possible. Data will be secured in a locked office and the transcripts destroyed after five years. Only the researcher and project supervisor will have access to the data.

Your participation in this study is voluntary and there are no foreseeable risks. It would be greatly appreciated if you would answer all the material as frankly as possible, you are not obligated to answer any material that you find objectionable or that makes you feel uncomfortable. You may also withdraw from the study at any time, without pressure or

consequence of any kind. If you choose to withdraw from the study you may request removal of all or part of your data from the study.

I intend to publish the findings of the study in professional journals and report them at conferences. At no time will your actual identity be disclosed. Only the project supervisor and I will have access to raw data.

Any questions about study participation may be directed to Jennifer Lisi, M.Ed. student, Faculty of Education, Queen's University (jen_lisi@hotmail.com, or 613-331-4082) or my supervisor Dr. Marie J. Myers (myersmj@queensu.ca, 613-533-3032 ext. 33032). Any ethical concerns about the study may be directed to the Chair of the General Ethics Review Board at 613-533-6081 or chair.GREB@queensu.ca.

If you consent to participate in this study, click "Continue", otherwise, you may exit the study.

Your interest in participating in this research study is greatly appreciated.

Jennifer Lisi

Appendix C – GREB Letter of Approval

June 10, 2010

Jennifer Lisi
PhD Candidate
Faculty of Education
Duncan McArthur Hall
Queen's University

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GREB Ref #: GEDUC-518-10
Title: "Interactive Whiteboard Technology: Perceptions and Attitudes of French
as a Second Language Teachers"

Dear Jennifer:

The General Research Ethics Board (GREB), by means of a delegated board review, has cleared your proposal entitled **"Interactive Whiteboard Technology: Perceptions and Attitudes of French as a Second Language Teachers"** for ethical compliance with the Tri-Council Guidelines (TCPS) and Queen's ethics policies. In accordance with the Tri-Council Guidelines (article D.1.6) and Senate Terms of Reference (article G), your project has been cleared for one year. At the end of each year, the GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB; of any adverse event(s) that occur during this one year period (details available on webpage http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html – Adverse Event Report Form). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes in study procedures or implementations of new aspects into the study procedures on the Ethics Change Form that can be found at http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html - Research Ethics Change Form. These changes must be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or irvingg@queensu.ca prior to implementation. Mrs. Irving will forward your request for protocol changes to the appropriate GREB reviewers and / or the GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, PhD
Professor and Chair
General Research Ethics Board

Copies to: Dr. Marie Myers, Faculty Supervisor
              Dr. Malcolm Welch, Chair, Unit REB
              E-REB: c/o Graduate Studies & Bureau of Research, Attn: Celina F

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Appendix D – Questionnaire Sample

Interactive whiteboard technology: Perceptions and Attitudes of FSL teachers

Have you ever attended a professional development workshop devoted to interactive whiteboard use in the FSL classroom?		
Answer Options	Response Percent	Response Count
Yes	0.0%	0
No	100.0%	14
I don't know	0.0%	0
Pass	0.0%	0
Comments		3
answered question		14
skipped question		1

Number	Response Date	Comments
1	Jun 19, 2010 10:49 PM	I believe the board offers Smartboard workshops for teachers who have Smartboards in their classrooms or who will be getting one but only for regular classroom teachers not FSL
2	Jun 29, 2010 2:36 PM	I have never seen one offered in either of the boards in my area
3	Jul 2, 2010 12:15 PM	I assume if I would to have an interactive whiteboard installed in my classroom that some sort of workshop would be required to teach me how to use it. Otherwise it would be a waste of time.

Appendix E – Interview Question Sample

1. What is your general understanding of interactive whiteboard technology use?

2. What is your understanding of interactive whiteboard technology use for second language learning, like French?

Appendix F – Letter of Information for Interview Participants

Online Letter of Information for Interview Participants
"Interactive Whiteboard Technology:
Perceptions and Attitudes of French as a Second Language Teachers"

Dear Participant,

My name is Jennifer Lisi, and I am a Master's student at the Faculty of Education at Queen's University, Kingston, Ontario. I am writing to request your participation in a research study that I am conducting. This research will contribute to my Master's project, under the supervision of Dr. Marie J. Myers. This study was granted clearance by the General Research Ethics Board for compliance with the "Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans", and Queen's policies.

The purpose of this study is to explore FSL teachers' perceived use, perceived ease of use and attitudes towards interactive whiteboard use. To do this, I am planning on analyzing questionnaire feedback from FSL teachers in Kingston and its surrounding areas as well as conducting individual interviews with those teachers who wish expand on their questionnaire responses. You have shown interest in participating in a semi-structured interview in a location that is convenient to you.. The interview will be approximately 60 minutes in length. The interview will be audio-recorded and transcribed verbatim. The audio recording will be destroyed after five years. The verbatim transcription of the interview will conceal your identity and the identity of people and schools you might mention throughout the course of the interview by using fictitious names. Data will be secured and confidentiality is guaranteed to the extent possible. Data will be secured in a locked office and the transcripts destroyed after five years. Only the researcher and project supervisor will have access to the data.

Your participation in this study is voluntary and there are no foreseeable risks. It would be greatly appreciated if you would answer all the material as frankly as possible, you are not obligated to answer any material that you find objectionable or that makes you feel uncomfortable. You may also withdraw from the study at any time, without pressure or

consequence of any kind. If you choose to withdraw from the study you may request removal of all or part of your data from the study.

I intend to publish the findings of the study in professional journals and report them at conferences. At no time will your actual identity be disclosed. Only the project supervisor and I will have access to raw data. You will be assigned a pseudonym and this only will be used in publications. If the data are made available to other researchers for secondary analysis, your identity will never be disclosed.

Any questions about study participation may be directed to Jennifer Lisi, M.Ed. student, Faculty of Education, Queen's University (jen_lisi@hotmail.com, or 613-331-4082) or my supervisor Dr. Marie J. Myers (myersmj@queensu.ca, 613-533-3032 ext. 33032). Any ethical concerns about the study may be directed to the Chair of the General Ethics Review Board at 613-533-6081 or chair.GREB@queensu.ca.

If you wish to participate in this study, please provide your consent by signing below.

_____ .   _____   _____
Name (please print)   Signature   Date

Your interest in participating in this research study is greatly appreciated.

Jennifer Lisi

Interview Consent Form

"Interactive Whiteboard Technology:
Perceptions and Attitudes of French as a Second Language Teachers"

ame (please print):_____

1. I have read and retained a copy of the Letter of Information and Consent Form and have had any questions answered to my satisfaction.
2. I understand that I will be participating in the study called *Interactive Whiteboard Technology: Perceptions and Attitudes of French as a Second Language teachers*. I understand that this means that I will participate in a voluntary 60 minute audio-recorded face-to-face interview.
3. I understand that my participation in this study is voluntary, I may withdraw from the study at any time and that I may request the removal or all or part of my data.
4. I understand that fictitious names will be used to describe me and my school in the publication of the findings. Should I be interested, I understand that I am entitled to a copy of the findings.

Any questions about study participation may be directed to Jennifer Lisi, M.Ed student, at jen_lisi@hotmail.com or 613-331-4082 or to Dr. Marie J. Myers (myersmj@queensu.ca, 613-533-3032 ext. 33032). Any ethical concerns about the study mat be directed to the Chair of the General Research Ethics Board at 613-533-2081 or chair.GREB@queensu.ca

Please retain a copy of this consent form for your records.

I have read the above statements and freely consent to participate in this research. If you consent to participate in this interview, please sign below

_____   _____   _____
Name(please print)   Signature   Date.

If you requested a copy of the results of the study please provide your mailing address and/or email address below:

Mailing Address: _____

                        _____

Email: _____@_____

Appendix H – Portion of Interview Transcript

1.   **What is your general understanding of interactive whiteboard technology use?**

Anna	Um, my general understanding of the technology is that it can be used to enhance lessons in the classroom. Whether it is by accessing the Internet, presenting a note, or whatever, the students are more engaged when they see the material on the whiteboard.
Beth	Well I have never used a SMARTboard, or interactive whiteboard before. There are a couple in the school that I teach at. It's my understanding that it's a tool that teachers and their students can use… it's a big screen that can be touched… objects can be moved around...manipulated. I have seen young students using it with ease, so I assume it's pretty easy to use (laughs).
Catharine	Limited.. (laughs) It is an opportunity to incorporate technology into a very basic concept of breaking down information and having to incorporate it. Especially in today's society where learners are adapting to the use of technology. To some extent I assume it is similar to a computer screen, just has more interactive capabilities. Instead of a mouse you used your hand or the markers but that was just an assumption that I had before I had one because I didn't need think I would ever have a whiteboard in my foreseeable future.