UNIVERSITÉ DE SHERBROOKE

Apprendre avec la technologie : l'impact sur l'enseignement et l'apprentissage de l'utilisation de la technologie numérique (SMARTBOARD) dans les classes

Learning with Technology: The impact on teaching and learning using digital technology (SMARTBOARD) in the classrooms

par

Farida Karim Alli

Essai présenté à la Faculté d'éducation

En vue de l'obtention du grade de

Maître en éducation (M.Éd.)

Maîtrise en enseignement au collégial

Janvier 2011

UNIVERSITÉ DE SHERBROOKE

Faculté d'éducation

Maîtrise en enseignement au collégial

Apprendre avec la technologie : l'impact sur l'enseignement et l'apprentissage de l'utilisation de la technologie numérique (SMARTBOARD) dans les classes

Learning with Technology:
The impact on teaching and learning using digital technology
(SMARTBOARD)
in the classrooms

par

Farida Karim Alli

A été évalué par un jury composé des personnes suivantes :

Research Supervisor	Dr. Elizabeth Charles	Directrice de l'essai
External Evaluator of the Masters Paper	_____	Évaluatrice de l'essai

SUMMARY

This research was devoted to gaining information on teachers' use of technology, specifically SMARTBOARD technology, for teaching and promoting learning in the classroom. Research has suggested that use of technology can enhance learning and classroom practices. This has resulted in administrators encouraging the use of SMARTBOARDS, installing them in classrooms and providing training and support for teachers to use this technology. Adoption of new technology, however, is not simple. It is even more challenging because making the best use of new technologies requires more than training; it requires a paradigm shift in teachers' pedagogical approach. Thus, while it may be reasonable to believe that all we need to do is show teachers the benefits of using the SMARTBOARD; research tells us that changing paradigms is difficult for a variety of reasons.

This research had two main objectives. First, to discover what factors might positively or negatively affect teachers' decisions to take up this technology. Second, to investigate how the SMARTBOARD is used by teachers who have embraced it and how this impacts participation in classrooms. The project was divided into two parts; the first was a survey research (Part 1), and the second was an ethnographic study (Part 2). A thirty-nine item questionnaire was designed to obtain information on teachers' use of technology and the SMARTBOARD. The questionnaire was distributed to fifty teachers at two EMSB schools: James Lyng Adult Centre (JLAC) and the High School of Montreal (HSM). Part 2 was an ethnographic qualitative study of two classes (Class A, Class B) at JLAC. Class A was taught by a male teacher, an early-adopter of technology and a high-level user of the SMARTBOARD; Class B was taught by a female teacher who was more traditional and a low-level user. These teachers were selected because they had similar years of experience and general competence in their subject matter but differed in their use of the technology. The enrollment in Class A and Class B were twenty-three and twenty-four adult students, respectively. Each class was observed for 90 minutes on three consecutive days in April 2010. Data collection consisted of videotapes of the entire period, and observational field notes with a graphical recording of

participatory actions. Information from the graphical recording was converted to sociograms, a graphic representation of social links among individuals involved in joint action. The sociogram data was tabulated as quantified data.

The survey results suggest that although most teachers are interested in and use some form of technology in their teaching, there is a tendency for factors of gender and years of experience to influence the use of and opinions on using technology. A Chi Square analysis of the data revealed (a) a significant difference ($\chi^2 = 6.031$, $p < .049$) for gender in that male teachers are more likely to be interested in the latest pedagogic innovation compared to female teachers; and, (b) a significant difference for years of experience ($\chi^2 = 10.945$, $p < .004$), showing that teachers with ≤ 6 years experience were more likely to use the SMARTBOARD, compared to those with more experience (>6 years). All other items from the survey data produced no statistical difference. General trends show that (a) male teachers are more willing to say yes to using the SMARTBOARD compared to female teachers, and (b) teachers with less teaching experience were more likely to have positive opinions about using the SMARTBOARD compared to teachers with more experience. The ethnographic study results showed differences in students' response patterns in the two classrooms. Even though both teachers are experienced and competent, Teacher A elicited more participation from his students than Teacher B. This was so partly because he used the SMARTBOARD to present visual materials that the students could easily respond to. By comparison, Teacher B used traditional media or methods to present most of her course material. While these methods also used visual materials, students were not able to easily relate to these smaller, static images and did not readily engage with the material.

This research demonstrates a generally positive attitude by teachers towards use of the SMARTBOARD and a generally positive role of this technology in enhancing students' learning and engagement in the classroom. However, there are many issues related to the SMARTBOARD use that still need to be examined. A particular point is whether teachers feel adequately trained to integrate SMARTBOARD technology into their curricula. And, whether the gender difference revealed is related to other factors like

a need for more support, other responsibilities, or a general sense of anxiety when it comes to technology. Greater opportunity for training and ongoing support may be one way to increase teacher use of the SMARTBOARD; particularly for teachers with more experience (>6 years) and possibly also for female teachers.

TABLE OF CONTENTS

LIST OF TABLES

RÉSUMÉ

Apprendre avec la technologie : l'impact sur l'enseignement et l'apprentissage de l'utilisation de la technologie numérique (SMARTBOARD) dans les classes

Cette recherche a été consacrée à la collecte d'information à propos de l'utilisation de la technologie par les enseignants, spécifiquement la technologie numérique SMARTBOARD, pour l'enseignement et la promotion de l'apprentissage. La recherche en éducation suggère que l'utilisation de la technologie numérique pour l'enseignement en classe peut améliorer les pratiques d'apprentissage parmi les étudiants. Cela a encouragé les administrateurs de l'éducation à promouvoir l'utilisation de SMARTBOARDS par l'installation de cette technologie dans les salles de classe dans l'ensemble de la Province et par la formation et le soutien aux enseignants sur la façon d'utiliser cette technologie. L'adoption des nouvelles technologies cependant, n'est pas chose facile. C'est même plus compliqué car tirer le meilleur parti de ces nouvelles technologies nécessite plus de formation ; Il exige un changement de paradigme dans l'approche pédagogique de l'enseignant. Ainsi, s'il est raisonnable de croire que tout ce que nous devons faire c'est montrer les avantages de l'utilisation de la SMARTBOARD aux enseignants, la recherche nous apprend qu'il est difficile de changer les paradigmes pour une multitude de raisons. En outre, il y a peu d'informations sur l'utilisation du SMARTBOARD dans les classes des apprenants adultes et en particulier dans les classes pour adultes.

Cette recherche avait deux objectifs principaux. Tout d'abord, pour découvrir quels sont les facteurs pouvant affecter positivement ou négativement la décision des enseignants d'adopter cette technologie. En second lieu, afin d'étudier comment le SMARTBOARD est utilisé par des enseignants qui l'ont adopté et comment cette utilisation influe la participation dans leurs salles de classe. Ces études ont été menées dans deux établissements affiliés à la Commission scolaire de Montréal (CSEM). Ce programme est axée sur les apprenants adultes, dont la plupart sont des nouveaux immigrants ayant de l'expérience à titre de professionnels dans leur pays d'origine, mais incapable de communiquer en anglais. Ces étudiants sont intelligents, mais font face à de nombreux obstacles en raison de cette barrière de la langue. Ils sont généralement motivés parce qu'ils ont besoin de ces compétences linguistiques afin de trouver un emploi et communiquer avec d'autres dans leur pays adoptif. Ce projet de recherche a été divisé en deux parties. La première était une enquête (partie 1), et la seconde était une étude ethnographique (partie 2). L'enquête se composait d'un questionnaire de 39-item conçu pour obtenir des informations sur l'utilisation, par les enseignants, de la technologie numérique en général, et le SMARTBOARD en particulier, dans leurs classes. Le questionnaire a été distribué à cinquante enseignants à deux écoles au sein de la CSEM: James Lyng adultes Centre (JLAC) et l'école secondaire de Montréal (HSM). Trente-cinq questionnaires ont été remplis et retournés par les enseignants.

La Partie 2 était une étude qualitative ethnographique de deux classes qui ont été filmées sur trois jours consécutifs. Il s'agissait de deux classes (classe A, classe B) au Centre adultes James Lyng. Le consentement pour la recherche a été obtenu de la CSEM, du directeur de l'école, des deux professeurs et de leurs étudiants respectifs. La Classe A

été enseignée par un enseignant, considéré comme un utilisateur de la technologie en général et comme un utilisateur de haut niveau de la SMARTBOARD; Pendant ce temps, la classe B a été enseignée par une enseignante qui était plus traditionnel et considérée comme un utilisateur de bas niveau. Ces enseignants ont été choisis parce qu'ils avaient des profils semblables en termes d'années d'expérience et de compétence générale, mais ils diffèrent dans leur utilisation de la technologie. Ce qui a permis d'enquêter sur l'influence de l'utilisation, ou de la non utilisation, de la SMARTBOARD sur la participation des élèves. L'inscription en classes A et B était de 23 et 24 étudiants adultes, respectivement. Les observations ont eu lieu environ à commencement du semestre en avril 2010. Chaque classe a été observée sur trois jours consécutifs, pour une période de 90 minutes à chaque fois. La collecte de données se composait de bandes vidéo de l'ensemble de la période, ainsi que des notes prises sur le terrain d'observation sous forme d'enregistrements graphiques à propos de la participation des élèves. L'information obtenue de l'enregistrement graphique a été convertie en sociogrammes, une représentation graphique des liens sociaux entre individus impliqués dans l'action commune. Cette technique est basée sur l'analyse des réseaux sociaux, ce qui est souvent utilisé par les sociologues de comprendre les interactions des individus faisant une tâche normale. Les données des sociogrammes ont été compilées sous forme de données chiffrées. Les deux classes ont été comparées en utilisant les tableaux de données. Les cassettes vidéo et les notes de terrain ont été utilisées pour confirmer les sociogrammes.

Les résultats de l'enquête sur les enseignants suggèrent que bien que la plupart des enseignants sont intéressés à la technologie et en utilisent une forme quelconque dans leur enseignement, il existe une tendance pour les facteurs de l'égalité entre les sexes et des années d'expérience d'influer sur l'utilisation des technologies. Une analyse du Chi carré sur les données ont révélé une différence significative ($\chi^2 = 6.031$, $p < .049$) pour le sexe et que les enseignants mâles sont plus susceptibles d'être intéressés par la dernière innovation pédagogique comparée aux enseignantes ; et (b) une différence significative pour les années d'expérience (expérience ($\chi^2 = 10.945$, $p < .004$), montrant que les enseignants ayant peu d'expérience (≤ 6 ans) étaient plus susceptibles de dire oui à l'utilisation de la SMARTBOARD, par rapport à ceux qui ont plus d'expérience (> 6 ans). Tous les autres éléments de l'enquête ne produisent aucune différence statistique. Les tendances générales montrent que les enseignants (a) les mâles sont plus disposés à dire oui à l'utilisation de la SMARTBOARD par rapport aux enseignantes et (b) les enseignants avec moins d'expérience en enseignement étaient plus susceptibles d'avoir des avis favorables sur l'utilisation de la SMARTBOARD par rapport aux enseignants avec plus d'expérience.

Les résultats de l'étude ethnographique a montré des différences dans le patron de la participation des élèves dans les deux classes observés. Même si les deux enseignants sont expérimentés et compétents, l'enseignant A a obtenu plus de participation de la part de ses étudiants que le professeur B. Il en était ainsi en partie parce que ses conférences utilisaient la SMARTBOARD comme une façon de présenter le matériel visuel auquel les étudiants pouvaient facilement répondre. Par exemple, il a projeté des images photographiques et a inclus la vidéo; cela a capturé l'attention des étudiants, en leur donnant la possibilité de participer à l'apprentissage. Par conséquent, ils ont commencé à

répondre à des questions sans être sollicités et même à générer certaines de leurs propres questions. En bref, ils apparaissaient motivés et enthousiastes pour leur apprentissage. Par comparaison, l'enseignant B a utilisé les médias et méthodes traditionnels pour présenter la plus grande partie de du contenu de cours. Par exemple, elle a accroché des photos sur le tableau noir. Alors que cette méthode a également utilisé des matériaux visuels, les étudiants n'ont pas pu facilement se connecter à ces images qui sont plus petites et statiques. Au lieu de cela, ils attendaient d'être sollicités par l'enseignant, ont rarement répondu aux questions sans être appelés et n'ont jamais généré leurs propres questions.

Les résultats de cette recherche démontrent une attitude généralement positive de la part des enseignants pour l'utilisation de la SMARTBOARD et un rôle généralement positif de cette technologie pour améliorer l'apprentissage tout en engageant les élèves dans le processus d'apprentissage. Selon les résultats de cette étude, il y a plusieurs questions liées à l'utilisation de la SMARTBOARD dans la classe qui doivent encore être examinées. Une question en particulier est si les enseignants sont formés adéquatement pour intégrer la technologie SMARTBOARD dans leurs programmes d'études. Et, si la différence entre les sexes révélée est liée à d'autres facteurs comme un besoin de plus de soutien, autres responsabilités ou un sentiment général d'anxiété, lorsqu'il s'agit de la technologie. Ayant SMARTBOARD dans la classe est un atout pour l'enseignant mais seulement si l'enseignant est en mesure de l'utiliser efficacement. Plus de formation et de soutien peuvent être une façon d'accroître l'utilisation de la SMARTBOARD par l'enseignant; particulièrement pour les enseignants avec plus d'expérience (> 6 ans) et peut-être aussi pour les enseignantes.

ACKNOWLEDGEMENT

This study was supported and made possible by James Lyng Adult Centre, and High School of Montreal of the English Montreal School Board. I would like to thank all the teachers who participated in this study, in particular the two teachers who allowed me to do my observation in their classrooms. I would also like to thank the Principals, Ms. Habza Schedlack of James Lyng Adult Centre, and Mr. Ben Fagan of High School of Montreal who supported this research. Many thanks to the English Montreal School Board and John Abbott College for their consideration and support, and to all my cohorts in the Masters Teachers program for their support throughout this degree.

There were many individuals who contributed in helping me to complete this research project. I would especially like to thank my Academic Supervisor Dr. Elizabeth Charles for her time, understanding, patience, respect, along with her valuable comments and suggestions as a Supervisor throughout this study. Thanks also to Mr. Carlos Gomez-Garibello and Lisa Hancock for their assistance with the statistical analysis of the survey questionnaire data, and Dr. Salwa Karboune for the French translation of the abstract.

My journey through this Masters Teacher Program at the University of Sherbrooke Performa was not only a challenge but a learning experience that I will benefit from for the rest of my life. This degree involved many sacrifices from my family; I would like to thank my two sons, Alam and Asif for their constant support. Lastly, there are not enough words to thank my husband, Dr. Inteaz Alli who has supported me from the beginning to the end of this Master's degree. Thank you for believing in me especially for the times when I wanted to quit, you were always there with encouragement and unconditional love and support.

INTRODUCTION

Living in the 21st century, at a time when students from across the spectrum of the educational system live, learn and play in a media-saturated society, can easily result in students gradually becoming disengaged from traditional ways of learning. Hence, in order to be at the students' level, should teachers have accessibility to new teaching tools in their classroom, and use new technology such as the SMARTBOARD[1] - an interactive whiteboard with a large touch-sensitive screen that works in conjunction with a computer and a projector? Can this teaching tool accommodate students' needs and interests effectively helping to promote better participation and student engagement?

Miller *et al* (2004) found that Information and Communication Technology (what is often referred to as ICT), such as the SMARTBOARD, can be used in ways that engage learners, support their diverse learning styles, make lessons more interactive and student-centered. In doing so, such technology can help teachers move away from traditional teacher-centered approaches help them adopt more active constructivist pedagogies what are sometimes called active learning. This new approach is marked by a change of thinking by the teacher who is seeking to use technology as an integral part of most lessons. Teachers who are knowledgeable in ICT look to find ways to use the SMARTBOARD as a stimulus for pupils to respond by exploiting the interactive capacity of the technology through resource materials from the internet SMARTBOARD dedicated software to list a few. The purpose of this study was to investigate the extent to which teachers use ICT in general, and the SMARTBOARD in particular, in their teaching and to discover whether or not they believe this technology influenced their approach to teaching, and their students' engagement and learning.

---

[1] The SMARTBOARD connects to a computer with a USB cable and draws the power it needs from the computer. The SMARTBOARD driver automatically starts when the computer is turned on and the interactive whiteboard becomes active once the driver is running. Optical sensors in the pen tray automatically detect when a tool is lifted and send this information to the computer. For instance, if someone picks up the red pen, the next contact with the surface will be in red ink. If someone picks up the eraser, the ink is erased. LED lights indicate which tool is active. If more than one tool is removed from the tray, the last tool selected will be active (SMART Technologies Inc., 2006).

Furthermore, interactive technologies such as the SMARTBOARD are well positioned for use in a variety of classroom activities. Because they are driven by computers they can present content in a variety of ways and accommodate a variety of teaching strategies. For example, making learning visible, presenting auditory lessons, allowing the placement of objects to be manipulated in a tactile manner, or a combination of all of the above; this is often referred to as the "affordances" of a tool (Gibson, 1977). This research also investigated whether certain features of the SMARTBOARD influenced student participation in the classroom. For example, how did the use of visualizations such as text, pictures, video and animation help or promote learners participation in activities? Or, how did the use of the audio affordances of the SMARTBOARD, such as sound capabilities help second language learners? And, how did the touch-screen affordances (tactile qualities) of the SMARTBOARD promote interaction and engagement?

A two-part study was conducted to achieve the research objectives stated above. Part one was a survey study in which information on teachers' use of technology and the SMARTBOARD in their teaching was collected using a questionnaire designed by the researcher. Part Two was an ethnographic study that collected data from two teachers in their respective classrooms: Teacher A was identified and characterized as an "early adopter" of the SMARTBOARD, while Teacher B was identified and characterized as a "late adopter" who occasionally tried out the SMARTBOARD. Early adopters (a term coined by Rogers, 1962) usually embrace new technology before anyone else does; they are not afraid to try out new things – such as hardware and software technology. Early adopters though eager to explore, will not take unnecessary risks; they will most likely develop new methodologies in their teaching strategy unlike "late adopters" who are usually reluctant to implement something new; often slow to embrace new products, technology or ideas.

There are many concerns about whether the SMARTBOARD is being used in a manner befitting a Constructive[2] paradigm,, and whether teachers are generally interested and adequately supported to integrate information technology with SMARTBOARD into their curriculum (Knight, Pennant, & Piggott, 2005). The findings from this study will be helpful to many schools, administrations and teachers as important decisions are being made regarding the allocation of financial and human resources toward the purchase and placement of this technology into present and future classrooms.

[2] Constructivism refers to a theory of knowledge and learning where knowledge is constructed rather than transmitted and prior ideas/ beliefs interact with experiences. For a full description see Lowenthal, & Muth (2008).

CHAPTER ONE
PROBLEM STATEMENT

At the start of the 2007-2008 school year teachers at James Lyng Adult Centre of the English Montreal School Board (EMSB) received their initial training in the use of the SMARTBOARD technology for teaching. During the same school year, and also in the summer of 2008, approximately 13 SMARTBOARDS were installed in various classrooms with the expectation that this technology would be incorporated into the pedagogy of the teachers using these classrooms. Many other schools in the EMSB are also looking at a future in which such digital technology will play a prominent role in the education of their diverse student populations.

While such technologies offer teachers new ways of interacting with their course material as well as with their students, they also require teachers to change their classroom practices. This change coincides with a paradigm shift in education toward Constructivist and Social Constructivist views of learning. Recent studies (Adams, 2007) have suggested that digital environments designed for learning need to support ways for students to take ownership of their knowledge development, this can be accomplished by recognizing that learning theories can compliment each other in some ways. Adams (2007) presents a theory that combines three aspects: (1) dimensions of knowledge approach, which includes both students' and teacher's intention for engagement involving knowledge acquisition, application and generation as recursive steps; (2) the teacher-student relationship with regards to responsibility for knowledge construction being released from the teacher to the learner; and, (3) teaching strategies that can range from behavioral drill and practice to constructivist strategies of scaffolded discovery. Thus, the implementation of digital technologies means that teachers have to take up new tools as well as adopt new ways of thinking about their pedagogy.

This is a big challenge for teachers for a variety of reasons, ranging from a reluctance or fear of taking up new tools to believing that the new approaches to learning

do not work. Whichever the answer, researchers and administrators need to better understand the beliefs and needs of teachers as they begin to take up this new technology.

Simultaneously, there are some teachers who readily take up new technologies, who might be referred to as "early-adopters". They are important sources of information and researchers can learn from these real-life applications of technology into classroom practices. In the school where this research was conducted there was one such teacher. A decision was made to observe this teacher and his teaching counterpart who could be described as a "late-adopter". According to Honingsfeld *et al*, (2009) what can be described as an early-adopter or **high-level user** is a teacher who demonstrates a "profile for planning technology-based activities in which students achieve success in learning, communication, and life skills." The following points describe how a teacher (**high-level user**) integrates technology with pedagogy (Honingsfeld *et al*, 2009):

1. Demonstrates a sound understanding of technology and concepts.
2. Plans and designs effective learning environments and experiences supported by technology.
3. Implements curriculum plans that include methods and strategies for applying technology to maximize student learning.
4. Applies technology to facilitate a variety of effective assessment and evaluation strategies.
5. Uses technology to enhance their productivity and professional practice.
6. Understands the social, ethical, legal, and human issues surrounding the use of technology in schools and applies these principles in practiced.

On the other hand, a **low-level user** may occasionally use the SMARTBOARD but may not have the knowledge to fully optimize its potential use, and may be using it as a projector to project images or videos. A teacher of this type relies primarily on text books, handouts, tape recorder, and the traditional chalkboard to facilitate the students with learning materials and exercises.

Another issue emerging from the implementation of digital technology and its effects on pedagogy involves its use and affects on learning, particularly within certain populations of students. Educational research suggests that the use of digital technology, such as the SMARTBOARD, can improve motivation (Smonekh & Davis, 1997). Furthermore, according to Atkinson (2000), there is some evidence that supports the relationship between students' motivation, student performance, and their individual attributes (learning styles); he also suggests that student engagement is a critical aspect of student motivation during the learning process, and the more students are motivated to learn the more likely they are to be successful in their efforts. However, little is known about how adult students, such as those in our Adult Education system, adapt to these new pedagogical environments. As such, we need to better understand how adult students, particularly those with diverse and non-traditional backgrounds can benefit from these technologies and the pedagogy that goes with it.

1. RESEARCH QUESTIONS/HYPOTHESES

This research has two main objectives. The first is to obtain information from teachers about their interest and actual use of technology and the SMARTBOARD as part of the teaching and learning process. To achieve this objective a questionnaire was designed by the researcher to elicit such information.

The second objective is to understand how digital technology, in this case the SMARTBOARD, is being used to promote student participation in their learning. Specifically, how its use affects, or is affected by, the pedagogy and practices of the classroom. To achieve this objective, the research looked at how two teachers used the SMARTBOARD in their classrooms – one teacher being an early-adopter of this digital technology and using it extensively (i.e., the **high-level user**) and the other a late-adopter, relying instead on the traditional technology of the chalkboard (**low-level user**).

In order to know whether this digital technology facilitates teaching and learning, it is important to document what works and what does not. To that end, the intent of this part of the research was to discover how this new technology was used, and determine

whether or not its use had implication on how the class participated with the teacher and with each other.

The **Research Questions are:**

1. What do teachers think about the use of technology in general, and the SMARTBOARD in particular, in their teaching? Do they use it? If yes, what impact has it made on their teaching practices?

2. How does the way a SMARTBOARD is used impact the ways students interact with their teacher and with each other? Does the level of student engagement change with the different ways of using the technology?

The organization of the paper

Chapter 1 is the statement of problem, Chapter 2, provides a background to the literature in the field as well as describes what other research has been done in regard to the use of the SMARTBOARDs in the classroom. Chapter 3, provides a description of the research design and methods used, for the two part investigation. Part 1 was a survey research design and answered the first research questions, stated above. Part 2 was an ethnographic study that observed two teachers in their respective classrooms and documented their students' participatory actions using videotape and field notes. Chapter 4, describes the results of the two studies. The questionnaire results of Study 1 were analyzed using descriptive statistics; this is followed by a discussion section. The results of Study 2 were transcribed into a visual representation, which was later developed into a sociogram, the results of this being tabulated for comparison between the two classrooms; a discussion section follows. Chapter 5, the last chapter, is the conclusion statements along with recommendations.

CHAPTER TWO
LITERATURE REVIEW

1. BACKGROUND OF TECHNOLOGY IN EDUCATION AND LEARNING

It is widely reported that technology, as a tool for learning, has historically contributed to the education of humans. The role of language as an aspect of the technological tool comes from several disciplines: computer science, computational and theoretical linguistics, mathematics, electrical engineering and psychology. Needless to say, technology changes with time. In ancient times, humans drew in the sand or stone to convey ideas, to teach and to pass on their knowledge; for example, cave paintings, symbols and hieroglyphic. With the development of language over the years, story-telling and dramatizations enhanced the ways we communicated ideas and lessons passed down from one generation to the next. In time, the printed word and the mass production of books (i.e., the printing press) allowed scholars and teachers to share ideas and knowledge on a wider scale. With the industrial revolution and the need for educating the masses, the primary technology of the classroom was born, the chalk-board. Also at that point, the primary mode of teaching as the transmission of knowledge took hold. The teacher was the center of the classroom and on a stage. The center of the stage was the chalk-board. Since then, educators have experimented with a variety of technologies in the classroom, for example, televisions and computers. Most of us would agree that those technologies have changed every aspect of our society significantly, but the nature of our educational system has not significantly changed (Warschauer & Meskill, 2000).

Butler-Pascoe and Wiburg (2003) spent a substantial part of their research describing the twelve attributes that relate to Technology-Enhanced Language Learning Environment (TELLE). Of the twelve attributes, five were of significant value when technology was used to enhance language learning: (1) provides interaction, communicative activities, and real audience; (2) supplies comprehensible input; (3) supports development of cognitive abilities; (4) facilitates focused development of English language skills; and (5) meets affective needs of students. Furthermore, they

state: "the self-esteem of second language learners is enhanced when ... they produce accurate, attractive work using word processing and desktop publishing" (p.18). They also found that using technology, learners develop research skills, critical thinking, and inquiry-based learning in a way that they become responsible for their own learning and check the validity of information they receive in or outside class. Since language skills (listening, reading, speaking and writing) are the basis for language learning, learners are supposed to have enough room for a balanced practice of the four skills in order to be competent in second language. Technology as a personalized tool for learning allows learners to have enough practice of the four skills: speaking, listening, reading, and writing.

In today's world, the latest wave of technology is interactive. Unlike TV and first generation computing, the new technology offers the possibility of changing the ways we interact with our students. With this potential for change, it is important to understand whether teachers and students are willing to embrace this new technology and whether it can be used to the advantage of improving learning. But it is important to note that technology is not a solution in and of itself.

According to Mishra and Koehler (2006) technology and pedagogy must be integrated at several levels, even though they are two separate entities of the four learning aspect of designing for learning what they call "Technological Pedagogical Content Knowledge" (TPCK). These four factors are an attempt to capture some of the essential qualities that teachers must consider when they wish to successfully integrate technology into their teaching, while addressing the complex, multifaceted and situated nature of teacher's knowledge. The main point of the TPCK framework is the complex interplay amongst the three components: content knowledge, pedagogy and technology. Mishra and Koehler (2006) further suggests that effective technology integration with appropriate pedagogy requires some relationship between the three components.

Thus, it is important that technology not be the focus of the course design. Therefore we need to understand what technology can do best (its affordances for promoting learning) and see how those complement the pedagogical goals of teachers.

Lastly, these need to also fit with the need of delivering content knowledge. In the case of this research, the content knowledge was the curriculum that dealt with English, the language of instruction. The upcoming sections will describe each of these ideas, one at a time. Before describing the role and advantages of technology, it is important to establish why changes to the way we teach are important.

2. THEORETICAL FOUNDATION OF A CHANGING APPROACH TO PEDAGOGY

This study is based on the theoretical tenets of constructivism and social constructivism. Constructivism is a theory of learning that proposes that knowledge is constructed by the learner through interactions with their own prior experiences, the environment and beliefs (Piaget, 1990). According to Vygotsky (1978), "Social constructivist learning intervention is where contextualized activities are used to provide learners with an opportunity to discover and collaboratively construct meaning as the intervention unfolds" (p.85). Similarly, Baxter Magolda, (1992) claims that social constructivism emphasizes the importance of culture and contextual knowledge through understanding of what is happening in the social setting of a discipline or practice and constructing knowledge based on these understandings and contextualized meanings.

According to Dewey (1938/1997) constructivism is not new; as early as the turn of the last century his writings demonstrate his support of these ways of thinking about education and teaching. Constructivism proposes that the construction of knowledge is influenced through exploration, inquiry and play with ideas. From this perspective, knowledge is actively constructed by the learner and not passively received from the environment. Progressive education is grounded in the principle of freedom to learn. Although Dewey claimed that this is not the "only" way to learn he did not elaborate on the supports needed. Recent studies, however, show that students cannot be given total freedom. In fact, learners need support and guidance in their efforts to learn, what is called scaffolding, which allows them to build their competence - based on Vygotsky's zone of proximal development (Bransford, Brown & Cocking, 2000).

Dewey also believed that education should be designed on the basis of theory of experience. Each student learns something from an experience, which has an impact on his or her future experiences in a positive or negative way. Since each learner constructs his or her knowledge in their own way, Dewey further emphasized the importance of "experiential learning" as being an active process in education. Students are able to learn from each other, in an interactive way as they are able to share experiences that may help them in their future studies or projects. What makes social constructivism different to the traditional ways of teaching (teacher center) is that the classroom is no longer a place where the teacher ("expert") pours knowledge into passive students, who wait like empty vessels to be filled. In a traditional classroom, materials are primarily textbooks and workbooks, learning is based on repetition, teachers disseminate information to students while students are the recipients of knowledge, finally knowledge is perceive as inert.

From a social constructivist perspective (Vygotsky, 1978), knowledge is also acquired through activity that takes place within the context of a social environment such as in a classroom. This often includes the instructor and fellow students sharing information through a process of collaborative learning. Vygotsky (1978) claims that the process of constructing ideas and internal representations is essentially social; the role of an educator is to facilitate students with new learning ideas that are meaningful. As such, learning can be described as an ability to participate appropriately.

According to Vygotsky, students should be learning through real-life tasks and challenges, and tools are a critical part of learning. Teaching becomes the institution of learning, and the teaching tool is an important means of communication between teacher and students. Thus, the correct choice of teaching tool can add to the benefits of learning with a constructivist pedagogy. ICT supports learners within the Vygotskian zone of proximal development; the interactive support from the computer software allows learners to draw on skills and concepts they have mastered to some extent.

3. ROLE OF MOTIVATION IN LEARNING

Student engagement is critical to the learning process, and student motivation is critical to the willingness to engage in the learning activity (e.g., Järvelä, Järvenoja & Veermans, 2008). The more students are motivated to learn, the more likely it is that they will be successful in their efforts. The evidence from several researchers indicate that with the proper training and effective use of the software technology, teachers can create a motivating environment in the classroom, making it more conducive to learning (Armstrong *et al,* 2005).This paradigm, if used with innovative pedagogy can improve both learning and teaching simultaneously.

According to Slavin, (1994), teachers can help students construct their own understanding by making the lesson meaningful and relevant, and by allowing them to apply their ideas at a higher level. Teachers should develop ways of adapting instructions to lessons to students' level of knowledge by motivating students to learn using different techniques that are suitable for all types of learners. When instruction is of high quality, the information presented makes sense to the student; it is interesting and easy to remember.

4. MOTIVATION AND TECHNOLOGY

It is understandable that student engagement is critical to student motivation during the learning process, and the more students are motivated to learn, the more likely they will be successful in their efforts. Much of the evidence suggests that the use of SMARTBOARD can result in enhanced student motivation. Nevertheless, there is still much more to be studied in relation to the use of the SMARTBOARD in the classroom. For instance, there is a need to determine whether the SMARTBOARD can enhance learning of those who are better at visual learning through the use of diagramming and manipulating objects; whether kinesthetic or tactile learners are more engaged in their learning because they are able to reinforce learning through exercises involving touch, movement and space on an interactive whiteboard; and, for auditory learning, can the

SMARTBOARD really help students with oral pronunciation and speeches (Knight, Pennant, & Piggott, 2005).

Additionally, students today come to class with established world-views formed by prior experience and knowledge, much of which comes from media sources. It is thus reasonable to believe that we might use similar media to motivate the classroom learning. In order to educate and motivate students on current cultures and views, the use of multimedia software technology, through the SMARTBOARD, might evoke curiosity through images and sounds that keep the students engaged in the lesson taught, thus, making learning more fun and interesting.

5. ROLE OF INTERACTIVE TECHNOLOGY IN LEARNING

Among the interactive technologies, the SMARTBOARD is gaining recognition in the United Kingdom as a useful instructional tool especially within the primary and secondary sectors. Shanly (2007) states that the UK Government (that of: former Prime Minister – Tony Blair) had projected allocating funds (approximately £50 million) so that by the year 2010, every primary and secondary school would be set up with a SMARTBOARD. One of the main reasons for promoting this technology is its ability to directly support interactive whole class teaching.

A teacher can build an entire lesson around interactive technology without even opening a book or photocopying a sheet of paper. Anything can be imported or downloaded from a web site, whatever the topic. According to McNeese (2006), educators claim that technology allows them to make notes on visual components, such as Power Point and documentary clips; technology allows the teacher to bring history alive, thus creating curiosity and intellectual dialogue among students. They suggest that when it comes to interactive technologies, such as the SMARTBOARD, the learner is a participant in the process rather than a spectator. Because it is technically a large interactive display device, SMARTBOARD technology has the potential of not only showing things to large groups of people but also bringing people together. As such, it is

consistent with the Vygotskian (1978) ideals of making representations socially accessible to the community of learners.

One of the main reasons for promoting the SMARTBOARD technology is its ability to directly support interactive whole class teaching. Shanly (2007) claims that studies in the UK in math and science classes show that integrating SMARTBOARD activities is quite essential. The projected image from the SMARTBOARD competes successfully for attention. The teacher, the students and the material are linked together, connecting the whole class, while amplifying the taught lesson. For example, users can project an image on the board and then can write on the board once an image has been projected on it; the teacher can also add comments or make notations at the computer.

Many technology teachers and specialists reported enthusiasm for the SMARTBOARD in staff development or computer classes when showing students how to use a particular application. Because the presenter can run an application from the SMARTBOARD, using his finger instead of a mouse, it is easier to maintain the students' attention and demonstrate important features of a particular lesson. In other words, the environment allows one to interact without the distraction of other peripherals such as monitors, mouse and keyboards (Painter, 2005).

Other researchers (Armstrong, Barnes, Sutherland, Curran, Mills, & Thompson, 2005) have shown that the use of SMARTBOARD technology could be advantageous to the learning environment by promoting a dynamic interaction between instructors and learners, thus creating an opportunity for learners to develop their own social skills in their interaction with others. This is consistent with the tenets of constructivism and social constructivism, where the teacher and students are influenced by their previous experiences of learning, including cultural and ethnic influences, as they begin to use a new technology within a classroom thereby creating a new classroom culture. Accordingly, "what students learn relates to how a technology is used in the classroom, and how a technology is used relates to the teacher's (and students') perceptions of how it can be used, which also relates to their previous experience of similar technologies" (Armstrong, *et al*, 2005, p.457).

6. BENEFITS OF USING SMARTBOARD FOR STUDENTS

Students need to take a much greater role in their education and teachers need to slowly move away from lecturing and towards activities that focus on the needs of the student. Seminal scholars in the field of education, Piaget (1990) and Bruner (1996), both proposed that children learn best when they themselves are actively involved in the process of learning. One of the most important benefits of using the SMARTBOARD is how easily it allows the teacher to transition to this student-centered, performance-based activity in the classroom. The SMARTBOARD offers opportunity for students to be engaged and to participate fully in the activities that are carried out in the classroom.

According to Kennewell and Beauchamp (2007), there are recognized benefits from the use of SMARTBOARD for student participation in the classroom as compared to other methods, such as a blackboard or an overhead projector and screen. The full potential of an interactive board is only realized when it is used to bring information and ideas to students and then gives the students a chance to participate actively by using the board themselves. This is already being done with conventional whiteboards in numeracy and literacy lessons.

In studies comparing the benefits of using the SMARTBOARD for student participation compared to other methods, such as a blackboard or an overhead projector and screen, Kennewell and Beauchamp's (2007) results show a positive learning gain. They report that its design for supporting new teaching strategies of engaging and motivating students during the learning process has improved students' grade as well as their attendance in the classroom. For this reason, this current study looked into teachers' classroom to validate that the SMARTBOARD was actually an effective tool for teachers and students, and that they found using this technology to be useful. Similarly, Cogill (as cited in Painter, 2005) who conducted a small observation study also claimed that teachers found the SMARTBOARD empowered them to become better facilitators and that students were actually more interactive with their teachers in the classroom. Likewise, Solvie (2004) claims that the SMARTBOARD had become a

useful tool among her students in the classroom especially for "shared reading and guided writing" … "students were quite interested and contributed to her lessons" (p.4).

Schroeder (2007) reports on a research study that featured 72 students between the ages of 10 to 12 year-olds schooled in Britain, and teachers' perception of using the SMARTBOARD in their classroom. This study's findings show that students' motivation, attention span and emotions were heightened when the SMARTBOARD was implemented into the classroom. The research suggests that when an interactive whiteboard is being used in a class, students are noticeably more focused on what is happening and they are often supportive and encouraging of their classmates who are working on the board. In addition, the students who lacked confidence were helped by the knowledge that mistakes can be quickly put right or erased with the help of their classmates; the students gained confidence and felt empowered. Schroeder (2007) states:

> "An important finding is that there is a relationship between SMARTBOARDs and pupils' views of learning, with visual and verbal-social learning being particularly prominent. The way in which information is presented, through color and movement in particular, is seen by the pupils to be motivating and reinforces concentration and attention" (Schroeder, 2007; p. 866).

The interactive quality of the SMARTBOARD can lend itself to a degree of student participation as compared to the blackboard or even an overhead projector and screen. Rochette (2007), reports that in a traditional English classroom, the use of SMARTBOARD allowed the teacher to demonstrate to the whole class visually how to annotate and interpret passages. The SMARTBOARD became the visual facilitator in the analysis of a reading passage from textbook while student simultaneously made notes in their books. The big difference between writing on a blackboard is that the teacher runs out of space, while on the SMARTBOARD, notations can be saved in a file and recalled later for review purposes or even for another class that is to be taught later.

Miller and Glover (2007) suggests that from a teacher's perspective, with time permitting in the planning and preparation of materials using the SMARTBOARD,

teachers from math and foreign language disciplines found that they can be more 'intervisibility' while teaching up front, because the focal point is placed on the task. Materials presented on the SMARTBOARD are more realistic and up-to-date, and can be consolidated, saved and retrieved very easily for future references. Miller and his colleague also state that some important elements played a key role when using SMARTBOARD, these include:

1. assessment – marking time was reduced because it could be done as a group, putting the answers on the SMARTBOARD made it an interactive exercise as students were able to ask and analyze answers together as a group;
2. learning styles became more obvious for both teacher and student; in modern foreign language, patterns emerged when learning was associated with the kinesthetic experiences - students were able to make association with vocabulary and sound, phonetics and spelling, etc.,
3. teaching style – using the SMARTBOARD allowed teachers to be more interactive with their students' learning, this technology gave them the option to be more creative in their activity, compared to "their teaching approach which was much more didactic" (Miller *et al*, 2004, p.15); even though learning the extent of the software for the SMARTBOARD meant hours of preparation.

These authors also point to the difficulties involved in making the switch from black board to an electronic board. They claim that because of the significance of the interactive and collaborative aspects of the electronic whiteboard professional development of instructors using SMARTBOARD in various disciplines is critical. Other authors, such as Adrian (2004) and Hodge and Anderson (2007), claim that even though the SMARTBOARD brought much excitement to the education system, it also brought some frustration. Teachers had to spend hours setting up technology-based lessons and sometimes during the lessons there were technical glitches such as the website not working or software not responding to the touch commands from the SMARTBOARD, resulting in loss of class time, and the day's lesson not being completed. Teachers using

SMARTBOARD always have to be prepared with an alternative plan of action, especially when the web signals are weak or slow because of excess users in a school. Nevertheless, the positive outweighs the negative observations when using the SMARTBOARD, as students find it more interactive and visual as compared to using the traditional blackboard.

7. SMARTBOARD TECHNOLOGY AND LANGUAGE LEARNING

According to Fellingham's (2006) research, the program "Cutting Edge Digital" has now replaced hard copies of course books on the web; these course books have been scanned by Longman Pearson and can now be accessed through the SMARTBOARD in the classroom. Fellingham further claims that this digital material (CED) used instead of an actual book, served as a stimulus that gave students with various learning styles the opportunity to experience a more visual kinesthetic lesson that was more meaningful to them. This teaching methodology functions very well for second language acquisition (SLA), where formal grammar focused lessons do not fit well with natural cognitive learning development of most students. His research further claims that language teachers tend to use "task based" stimulus approach with the SMARTBOARD to connect to the real world through live discussions such as "Oprah and Dr. Phil", promoting active engagement in listening activities while at the same time encouraging language discussions.

8. CHALLENGES OF ADOPTING NEW TECHNOLOGY

While schools are looking at a future in which technology will become a new focus in educating students, what is greatly needed is a paradigm shift. To prepare for this paradigm shift, teachers need to be supported in their efforts to understand why they need to move away from the traditional way of teaching to a view of teaching and learning as enhancing student learning (Fellingham, 2006). Acculturation in schools must take place, but this is a slow process. Elementary teachers often use a constructivist

approach, but most secondary teachers continue to teach in a didactic manner (Miller & Glover, 2007). Thus, even though students come to high schools from a technology-enriched environment where they control information flow, they are expected to fit into an educational institution unchanged by the technology which has swept through society.

9. CLASSROOM OBSERVATIONS METHODOLOGY

The study of learner response patterns in the classroom has been the subject of several recent books and research papers. Good and Brophy (1997) have described and reviewed methods of quantitative and qualitative observations in the classroom. Moore's (1989) chapter on "Making Systematic Observations" was also found to be very useful. The information about systematic observation, descriptive data, the recording of data, observation time, and classroom interaction proved to be particularly useful (pp.17-30). Moore (1989) stated that, "systematic observation if made correctly, can provide highly accurate, detailed, verifiable information not only about students and your own teaching but also about the context in which the observations are made" (pp. 19-20).

According to Morris (1998), "in order to see anything in this world, we need to be able to take a step back from whatever it is we want to view" (p. 166). In order to see what is happening in a classroom, the instructor would have to step back and observe; this is not possible because of behavior patterns and unpredictable events that may occur in a lesson. Morris (1998) further states, "if a lesson is simply a series of unpredictable occurrences and behaviors, the teacher is constantly trying to stay on top of things and can never afford to step back mentally and take a look at what is going on" (pp. 167). According to Good and Brophy (1987), the quantitative approach helps researchers to see how frequently certain activity occurs in the classroom. This quantitative approach which was used in this research, focused on a particular type of observation which is known as a frequency measurement (Moore, 1989).

10. SUMMARY

Although the SMARTBOARD allow users many options, it is not without its drawbacks. For instance, the writing features are only available in programs, Microsoft Word and Excel. In addition, the user must have perfect handwriting in order for the software to recognize letters. Converting from handwriting to text requires patience and the willingness to retype multiple times (Schroeder, 2007).

Additionally, implementing constructivist pedagogies have two major concerns for teachers at post-elementary levels: (1) time constraints imposed by content heavy curricula; and, (2) issues of classroom control. This manner of active learning, with group work, sharing, and time for technological exploration, is more time-consuming than straight lecture/demonstration. We need to understand how to use the technology within the time constraints; and we need to understand how to manage group work. We also need to understand when the SMARTBOARD use may be beneficial and when it may interfere with other learning goals. These are questions that still need to be addressed.

Also, we need to understand more about how teachers feel about using this new technology, what it means for their preparation both pedagogical training as well as technology training, how it affects their time commitment related to course preparation. In other words, does this new technology require greater course preparation time? While there are some studies that show the benefits of using the SMARTBOARD, we need to better understand how they can be effectively used in real classrooms with particular types of student populations. What are successful strategies, and how do these strategies encourage students to participate? These are the questions and issues that this research was intended to investigate:

1. What do teachers think about the use of technology in general, and the SMARTBOARD in particular, in their teaching? Do they use it? If yes, what impact has it made on their teaching practices?

2. How does the way a SMARTBOARD is used impact the ways students interact with their teacher and with each other? Does the level of student engagement change with the different ways of using the technology?

CHAPTER THREE
RESEARCH DESIGN & METHODOLOGY

1. RESEARCH DESIGN

There were two components in this research. The first component (Part 1) was a survey study that featured a 39-item questionnaire distributed to fifty teachers. The purpose of Part 1 was to obtain from teachers: (a) information on their use of technology, in general, and SMARTBOARD digital technology, in particular the curriculum that dealt with English, language of instruction; and (b) information that might corroborate classroom observations gathered in Part 2. The second component (Part 2) was an ethnographic qualitative study of two Basic Literacy classes on 3 consecutive days; these sessions were video-taped. The purpose of Part 2 was to investigate the role of the SMARTBOARD in two classes of adult learners in these classes by observing students' response and participation patterns with a view to gaining a better understanding of who participated, in what manner, under which conditions, and what motivated them to participate.

2. PART 1: SURVEY QUESTIONNAIRE

2.1 Participants

The participants were fifty teachers recruited from two schools, in the English Montreal School Board (EMSB), James Lyng Adult Centre and High School of Montreal. The researcher was a teacher in the Common Core Education Program at both of these schools during the past 2 years.

2.2 Context or Setting

Each participant teacher consented to completing the questionnaire designed to gather information on the use of SMARTBOARD digital technology to promote student learning. The questionnaire was distributed to the participants by the researcher at the

beginning of April 2010 with a request that it be completed and returned to the researcher within three weeks.

2.3 Data collection instrument

The questionnaire along with the covering letter is shown in Appendix B. The questionnaire consisted of thirty-nine questions in total, and was divided into six sections (A – F). Each section asked a set of specific questions relating to teachers' use of technology or the SMARTBOARD to enhance their teaching. The questionnaire was designed to obtain to obtain from teachers (a) information that might corroborate observations gathered in Part 2 and (b) information on teachers' use of digital technology the classroom.

The questionnaire was developed in consultation with the student's research supervisor, Dr. Elizabeth Charles. After the initial questionnaire was prepared it was pre-tested by two colleagues and two university professors, and a final version (version 6) was obtained and then distributed to the fifty teachers.

A total of 35 completed questionnaires were collected and numbered consecutively (1-35). This allowed the researcher to enter the data anonymously without identifying the teacher who completed the questionnaire.

3. PART 2: CLASSROOM OBSERVATIONS

3.1 Participants

The classroom included the teacher and students from two Literacy classes of a Common Core Education Program. For convenience, the teachers and students will be described independently although their interactions are a critical aspect of this analysis.

3.2 Teachers

Two teachers teaching in the English Montreal School Board (EMSB) Basic English Language course for more than twenty years and who worked together teaching the same level for more than five years, were recruited. The research was carried out at the James Lyng Adult Centre, where the two teachers worked; the teachers were colleagues of the researcher. In order to protect the teachers' identity they are not referred to by name, rather only as Teacher A and Teacher B. Teacher A is male and identified as a high-level user of the SMARTBOARD technology. He was representative of the "early adopter of technology into language pedagogy." Teacher B is female and identified as a low-level user. She was representative of the "low adopter of technology into language pedagogy."

3.3 Students

Teacher A's class consisted of 23 students (13 females and 10 males). Of these students, 15 were repeaters while eight were new students in that semester; this group is identified as Class A in the study. Teacher B's class consisted of 24 new students (19 females, and 5 males); this group is identified as Class B in the study.

These students were relatively new immigrants from the following countries: China, Russia, Romania, Iran, Moldova, Ukraine, Peru, Nicaragua, Congo, Iraq, Morocco, Algeria, Hong Kong, and Afghanistan Many of the students had previously taken French as a second language after their arrival in Montreal; for some students, English was their third, or fourth, or fifth language. Students were assigned to this Literacy level class based on an oral placement test (interview) administered by the school.

3.4 Procedure

One week prior to the anticipated start of the research, the researcher met with the teachers individually, and confirmed the dates for the classroom observations. It was arranged for both teachers to use the same pedagogical theme, "the Family," during the 3-day observation period. At this visit, the researcher was also introduced to the students

collected by the teachers before the research started. It was arranged that students, who did not want to be recorded by video would sit at the back of the class for the observation sessions. The researcher sat at the back of the classroom and the camera was located so that when the students were seated their faces were not recorded. The arrangement that was confirmed with the teachers was for the researcher to make observations in both classes on three consecutive days (April 21 – 23); the duration of the each observation would be approximately 90 minutes each time. Each classroom's set-up was similar in that both had a SMARTBOAD and access to a blackboard space. The location of the SMARTBOARD however, was different in these two classrooms. In Teacher A's classroom it was located at the front of the room, beside a blackboard (chalkboard), while in Teacher B's classroom it was on the side wall away from the blackboard (chalkboard); this location difference was noted as a possible explanation for some of the differences observed.

3.5 Data collection instruments

All sessions were videotaped. A Sanyo HDD Handycam video and audio recording system was used to record classroom observations on April 21, 22, and 23, 2010 from 8:30 a.m. to 10:00 a.m. (Teacher B), and from 10:30 a.m. 12:30 p.m. (Teacher A).Each day, the researcher observed each class for approximately 90 minutes and field notes were taken to be used as a way to triangulate between the videotape recordings and the sociogram analysis below.

3.6 Seating-plan and sociogram

A seating plan (Appendix G) was developed to show the seating position of each student for each observation period. The seating plan shows the students' initials, their country of origin and their gender (in parenthesis). Each student was assigned one box in the seating plan based the student's seating selection when entering the classroom. The researcher used this seating plan to record the data during the observation period. With the use of this seating plan, the researcher recorded students' responses or participation patterns which took place in the classroom during each observation period.

3.7 Coding system and sociogram

The researcher used the following categories for recording student's response patterns during the classroom observations, each symbol represented a definition (see Appendix C): 1) S=Solicited (teacher ask a question to a student, and this student responded); 2) U=Unsolicited (teacher ask a question to a student, and another student responded); 3) F=Free talk (students talking "off task" to each other); 4) NS=No response to a solicited question (teacher ask question and student did not respond); and 5) #=Student Ask Question. (student generated question). Each category of response was associated with a number, which represents the order of that category of response. For example, a code of S12 would indicate that the student's response was solicited and was the twelfth solicited response from the class, as a whole. The responses were recorded on the seating plan and the completed seating plan generated a sociogram (Appendix A, Figures 1, 2, 3) are the sociograms which were generated for the class taught by Teacher A; Appendix A, Figures 4, 5, 6 are the sociograms which were generated for the class taught for Teacher B.

Based on observations of the video tape, a fifth code #=Student asks question (any student asks a question to another student or teacher) this category was only observed on one day was added for the first day of observations only; on this first day there was a student presentation in each class and students asked questions during the presentation. This new code was added to sociograms (Appendix A, Figures 1 and 4).

From the observations made using the sociograms, the researcher asked the following questions in order to understand students' classroom behavior:

1. Who answer questions first? What gender are they? Where do they sit?
2. How long does it take a student to raise a hand or call out?
3. Who never answer? What gender are they? Where do they sit?
4. Who call out answers? Who raise their hands? Who never raise their hands?
5. Where does the teacher tend to stand in the classroom?

4. DATA ANALYSIS

4.1 Part 1

The data from the completed questionnaires were organized using Microsoft Excel and then subjected to qualitative, descriptive statistical analysis. Frequency data were calculated, expressed as percentages and tabulated based on school, gender and years of teaching experience. These data were later analyzed using a Chi Square analysis performed using SPSS software.

4.2 Part 2

The qualitative classroom observations of students' response patterns which were recorded in the seating plans and sociograms (Appendix A, Figures 1 – 6) were converted to numerical data which are shown in Appendix A, Tables 1 – 6. The observations from the classes of Teachers A and B were compared by analyzing the following response patterns data: (a) number of solicited and unsolicited responses during the 3-day observation period, and (b) total number of students responding and number of students who gave solicited and unsolicited responses (Table 34).

5. PROTECTION OF HUMAN SUBJECTS

The protection of human subjects is covered in the Student Consent Form and Faculty Consent Form, which was approved by the Montreal English School Board Human Research Committee in their approval process (Appendix C). The researcher received permission to carry out the study from the Montreal English School Board Human Research Committee. Students were not identified by name or by student ID; they were assigned specific codes or pseudonym. Only the researcher and her supervisor have permission to analyze these anonymous data and to view the video recordings. All information collected for the purpose of this research will be kept strictly confidential. No names or any other identification will be used in any publication(s) that may result out of

this study. All data collected will be used for this study only and destroyed when the study is completed.

6. LIMITATIONS OF THE DATA COLLECTION METHODS

As with all qualitative data collection, there are some limits to the generalizability of the findings. Additional, limitation to the data collection for Part 2 was that it was restricted to 3 days out of a term consisting of several weeks. Lastly, the students were at a beginner's level where they could not voice their own opinions about the use of the SMARTBOARD in the classroom, therefore, the researcher could not interview them to confirm or refute her assessment of their participation.

CHAPTER FOUR
RESULTS AND DISCUSSION

1. PART 1: SURVEY QUESTIONNAIRE

A total of 50 questionnaires were distributed to teachers at James Lyng Adult Centre (JLAC) and High School of Montreal (HSM). The results from the data analysis of these completed questionnaires are reported and discussed with the following objectives in mind: (i) to obtain information on teachers' use of the SMARTBOARD (ii) to obtain information that can be related to the classroom observations which were conducted in to Part 2 of this research project.

2. DATA FROM THE QUESTIONNAIRE RESPONSES

2.1 Questionnaire Section for all respondents:

2.1.1 Questionnaire Section A - Demographic information of respondents:

Tables 1, 2 and 3 summarize the data from survey Questions 1, 2 and 3; these data provide demographic information on the respondents who completed the questionnaires.

Table 1
Response Rate from Both Schools - Presented in Percentages

	Distributed	Completed	Response rate (%)
HSM	35	21	60
JLAC	15	14	93.3
Total	50	35	70

The data in Table 1 show that of the 50 questionnaires distributed, 35 (70%) were completed and received; this was considered as a successful return. Table 1 also shows that the return rate from HSM was 60% while the return rate from JLAC was 93.3%, and of the 35 completed questionnaires, 60% were from HSM and 40% were from JLAC.

Table 2
Gender of Respondents - Presented in Percentages

	Male	Female
HSM	33.3	66.7
JLAC	23.1	76.9
Total	29.4	70.6

Respondent's gender: Table 2 shows that overall females represented about two-thirds of the respondents (females 68.6%, males 31.4%) Looking at the gender response break-down at each school, HSM had 66.7% females compared to 33.3% males versus JLAC, which had 71.4% females to 28.6% males. A Chi square analysis shows no statistically significant difference between this male to female distribution between the two schools ($\chi^2 = 0.766$).

Table 3
Years of Experience of Respondents - Presented in Percentages

	Male		Female	
	≤6 years	*>6 years*	*≤6 years*	*>6 years*
HSM	10	25	20	45
JLAC	7.1	21.4	14.3	57.1
Total	8.8	20.6	17.6	52.9

Respondent's years of experience teaching: The data in Table 3 show that the majority of respondents (73.5%) had more than 6 years experience teaching, compared to 26.5% with six years or less. While slightly more male teachers from HSM had more years teaching (HSM 25%, JL 21.4%), this difference was not statistically significant (χ^2 =0.898).

2.1.2 Questionnaire Section B - Respondents' use of technology and pedagogic approach:

Tables 4 to 16 summarize the data from survey Questions 7 to 19; this set of data provides information on teachers' use of technology in general as part of their teaching.

Table 4
Data from Survey Question 7: Previous Use of Computers by Respondents Presented in Percentages

		Yes	No
SCHOOL	HSM	85	15
	JLAC	76.9	23.1
GENDER	Male	90.9	9.1
	Female	77.3	22.7
EXPERIENCE	≤6 yrs	75	25
	>6 yrs	84	16
ALL TEACHERS		81.8	18.2

Question 7 - Respondents' use of computer technology: The data summarized in Table 4 shows that a large majority (81.8%) of respondents report using some form of technology in their teaching. Positive responses appear to be slightly higher for HSM (85%) compared to JLAC (76.9%), however, these numbers were not statistically different (χ^2= 0.557). It appears that more male respondents (90.9%) compared to female respondents (77.3%) use computer technology in their teaching; however, these numbers were not statistically significant (χ^2= 0.519). There was no difference by years of teaching experience. The technologies mentioned include internet, videotape, SMARTBOARD, computer, PowerPoint, movies, CDs, VCR.

Table 5
Data from Survey Question 8: Level of Comfort with Technology
Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	42.9	33.3	23.8
	JLAC	35.7	28.6	35.7
GENDER	Male	18.2	45.5	36.4
	Female	50	25	25
EXPERIENCE	≤6 yrs	22.3	22.2	55.6
	>6 yrs	48	32	20
ALL TEACHERS		40	31.4	28.6

Question 8 - Respondents' comfort level with technology: The data summarized in Table 5 show that slightly less that one-third (28.6%) of teachers agreed/strongly agreed that they were always comfortable with technology. The data seem to indicate slightly higher responses for JLAC (JLAC 35.7%, HSM 23.8%) and for male teachers (male 36.4%, female 25%), and higher for teachers with ≤6 years experience (≤6 years 55.6%, >6 years 20%) apparently suggesting that recently hired teachers might be more likely to be comfortable with technology in their teaching; however, the Chi square analysis show that these differences were not statistically significant (gender $\chi^2 = 3.254$, experience $\chi^2 = 4.127$).

Table 6
Data from Survey Question 9: No Interest in Using Latest Technology in the Delivery of Course Material – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	76.2	14.3	9.5
	JLAC	85.7	0	14.3
GENDER	Male	81.8	0	18.2
	Female	79.2	12.5	8.3
EXPERIENCE	≤6 yrs	88.9	11.1	0
	>6 yrs	76	8	16
ALL TEACHERS		80	8.6	11.4

Question 9 - Respondents' interest in the use of computers in their teaching: The data in Table 6 show that a large majority (80%) of teachers disagreed/strongly disagreed with the statement that they have no interest in using latest technology for teaching. The response was similar by school and gender. The data appear to suggest a slightly higher response for teachers with ≤6 years experience (≤6 years 88.9%, >6 years 76%); however, the Chi square analysis reveal that this difference is not statistically significant ($\chi^2 = 1.651$).

Table 7
Data from Survey Question 10: Level of Use of Latest Technology in Delivery of Course Material – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	20	45	35
	JLAC	14.3	50	35.7
GENDER	Male	9.1	36.4	54.5
	Female	15.2	52.2	26.1
EXPERIENCE	≤6 yrs	12.5	25	62.5
	>6 yrs	20	52	28
ALL TEACHERS		17.6	47.1	35.3

Question 10 - Respondents' use of the latest technology in their teaching: The data in Table 7 shows that slightly more than one-third (35.3%) of teachers agree/strongly agree that they always try to use the latest technology in their teaching. There was no difference by school. The response appears to be higher for male (male 54.5%, female 26.1%) and for teachers with ≤6 years experience (≤6 years 62.5%, >6 years 28%). The data appear to suggest that male teachers and recently hired teachers might be more likely to try using the latest technology in their teaching; however, the Chi square analysis reveals that these differences are not statistically significant (gender $\chi^2 = 2.777$, experience $\chi^2 = 3.143$).

Table 8
Data from Survey Question 11: Interest in Latest Pedagogical Innovation (E.G., Problem Based Learning) – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	15	25	60
	JLAC	0	28.6	71.4
GENDER	Male	9.1	0	90.9
	Female	8.7	39.1	52.2
EXPERIENCE	≤6 yrs	0	33.3	66.7
	>6 yrs	12.5	20.8	66.7
ALL TEACHERS		8.8	26.5	64.7

Question 11- Respondents' use of the latest pedagogical innovation: The data in Table 8 shows that slightly less than two-thirds (64.7%) of teachers agree/strongly agree that they are always interested in the latest pedagogical innovation. There was no difference by school and by years of experience. There appears to be higher response for male (male 90.9%, female 52.2%); the Chi square analysis reveals that this gender difference was statistically significant ($\chi^2 = 6.031$, $p < .049$) confirming the observation that male teachers are more likely to be interested in the latest pedagogic innovation compared to female teachers.

Table 9
Data from Survey Question 12: Level of Interest in Using Latest Technology for Teaching and Learning – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	66.7	33.3	0
	JLAC	92.9	0	7.1
GENDER	Male	100	0	0
	Female	66.7	29.1	4.2
EXPERIENCE	≤6 yrs	88.9	11.1	0
	>6 yrs	76	20	4
ALL TEACHERS		77.1	20	2.9

Question 12 - Level of interest in using latest technology for teaching: The data in Table 9 show that a large majority (77.1%) of teachers disagree/strongly disagree with the statement that they are not interested in the latest technology for teaching and learning. The response appears to be higher for JLAC (JLAC 92.9%, HSM 66.7%), higher for male teachers (male 100%, female 66.7%) and slightly higher for teachers with ≤6 years experience (≤6 years 88.9%, >6 years 76.9%) suggesting that male teachers and teachers might be more likely to have interest in the latest technology for teaching and learning; however, the Chi square analysis reveal that these differences are not statistically significant (gender $\chi^2 = 4.573$, experience $\chi^2 = 0.795$).

Table 10
Data from Survey Questions Q.13.Rresponse to Taking Professional Development Courses to Improve Teaching – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	0	25	75
	JLAC	0	7.1	92.9
GENDER	Male	0	20	80
	Female	0	16.7	83.3
EXPERIENCE	≤6 yrs	0	11.1	88.9
	>6 yrs	0	16.7	83.3
ALL TEACHERS		0	17.6	82.4

Question 13 - Respondents taking professional development courses to improve teaching: The data in Table 10 show that a large majority (82.4%) of teachers agree/strongly agree that they have taken professional development courses to improve their teaching. There was no difference by gender and by years of experience but appear to be slightly higher for JLAC (JLAC 92.9%, HSM 75%).

Table 11
Data from Survey Question 14: Interest in Keeping up-to-date with Publications on New Teaching Methods – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	15.7	31.6	52.3
	JLAC	7.1	42.9	50
GENDER	Male	10	50	40
	Female	13.0	30.4	56.5
EXPERIENCE	≤6 yrs	0	50	50
	>6 yrs	16.7	29.2	54.2
ALL TEACHERS		12.1	36.4	51.5

Question 14 - Respondents' interest in keeping up-to-date with publications on new teaching methods: The data in Table 11 show that overall, about half of respondents (51.5%) agree/strongly agree that they read and/or keep up to date with information and

news that discuss new teaching methods. There was no difference by school and by years of experience. There appears to be a slightly higher response for female (female 56.5%, male 40%); however, the Chi square analysis reveals that this difference was not statistically significant ($\chi^2 = 1.156$).

Table 12
Data from Survey Question 15 – Interest in Keeping up-to-date with Publications on the Uses of Technology – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	33.3	14.3	52.4
	JLAC	16.7	41.7	41.7
GENDER	Male	20	20	60
	Female	30.4	26.1	43.5
EXPERIENCE	≤6 yrs	11.1	22.2	66.7
	>6 yrs	34.8	21.7	43.5
ALL TEACHERS		27.3	24.2	48.5

Question 15 - Respondents' interest in keeping up-to-date with publications on the uses of technology: The data in Table 12 show that overall, slightly less than half of teachers (48.5%) agree/strongly agree that they read and/or keep up to date with information and news that discuss uses of technology. The response appears to be slightly higher for HSM (HSM 52.4%, JLAC 41.7%), slightly higher for male (male 60%, female 43.5%) and higher for teachers with ≤6 years experience (≤6 years 66.7%, >6 years 43.5%), suggesting that recently hired teachers might be more likely to keep abreast with information about use of technology; however the Chi square analysis shows that these differences are not statistically significant (gender $\chi^2 = 0.777$, experience $\chi^2 = 1.985$).

Question 18 - Respondents' belief that technology could be a deterrent to some students in the classroom: The data in Table 15 show that slightly less than one-third (29.4%) of teachers agree/strongly agree that technology can be a deterrent to some students in the classroom. There appears to be a slightly higher response for HSM (HSM 35%, JLAC 21.4%), for male teachers (male 45.5%, female 26.1%), and for teachers with ≤6 years experience (≤6 years 44.4%, >6 years 25%); however, the Chi square analysis shows that these differences were not statistically significant (gender χ^2 = 0.380, experience χ^2 = 1.277).

Table 16
Data from Survey Questions 19: Respondents' Views on Use of the SMARTBOARD in their Teaching – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	33.3	19	47.6
	JLAC	21.4	21.4	57.1
GENDER	Male	18.2	18.2	63.7
	Female	33.3	20.8	45.6
EXPERIENCE	≤6 yrs	0	55.6	44.4
	>6 yrs	40	8	52
ALL TEACHERS		28.6	20	51.4

Question 19 - Respondents' views on use of the SMARTBOARD in their teaching: The data in Table 16 shows that overall, about half (52%) of teachers agree/strongly agree that when available they use the SMARTBOARD in their teaching. The response appears to be slightly higher for JLAC (JLAC 57.1% HSM 47.6%) for male teachers (male 63.7%, female 45.6%) suggesting that male teachers might be more likely to use the SMARTBOARD when it is available; however, the Chi square analysis shows that this gender difference is not statistically significant (gender χ^2 = 1.097). The results of the Chi square analysis of teachers experience show a significant difference (experience χ^2 = 10.945, $p < .004$) on this variable. This confirms that teachers with little experience (≤6 years) were more likely to say yes to using the SMARTBOARD, compared to those with

more experience (>6 years). Those with more experience were split 50/50 on their willingness to use this technology, while 100% of those with less experience were either willing to use the SMARTBOARD or neutral. Assuming that years of teaching experience is correlated with age, these results suggest that younger teachers are more likely to saying yes to the question of using this technology.

2.1.3 Questionnaire Section C - Course preparation and classroom practice <u>without</u> the use of the SMARTBOARD:

Table 17
Data from Survey Questions 20a: Time it Takes to Prepare a 4-Hour Lesson Plan Presented in Percentages

		≤4 hours	>4 hours
SCHOOL	HSM	80	20
	JLAC	85.7	14.3
GENDER	Male	90.9	9.1
	Female	78.3	21.7
EXPERIENCE	≤6 yrs	77.8	22.2
	>6 yrs	83.3	16.7
ALL TEACHERS		82.4	17.6

Table 18
Data from Survey Questions 21a: Do Teachers Encourage Students to Use the blackboard or Other Technology– Presented in Percentages

		Yes	No
SCHOOL	HSM	85.7	14.3
	JLAC	100	0
GENDER	Male	81.8	18.2
	Female	95.8	4.2
EXPERIENCE	≤6 yrs	100	0
	>6 yrs	88	12
ALL TEACHERS		94.3	5.7

Questions 20a and 21a - Respondents' lesson preparation time and encouraging students' use of traditional technologies: The data in Table 17 show that for teachers who do not use the SMARTBOARD, a large majority (82.4%) reported that it takes somewhere under 4 hours to prepare for a four hour class. There was no difference by school and by years of experience. The response appears to be slightly higher for male teachers, compared to female teachers (male 90.9%, female 78.3%). When it came to teachers encouraging their students to use the blackboard on any other technology, the results in Table 18 show that 94.3% of teachers reported that they did so. In other words, almost all these teachers encourage students to participate in their classrooms through the use of traditional public display tool.

2.2 Questionnaire Sections for only teachers who use SMARTBOARD:

Table 19
Percentages of Respondents Who Use the SMARTBOARD, Based on Data from Questions 22, 23 and 24 - Presented in Percentages

		Use SMARTBOARD	Do not use SMARTBOARD
SCHOOL	HSM	71.4	28.6
	JLAC	64.3	35.7
GENDER	Male	81.8	18.2
	Female	62.5	37.5
EXPERIENCE	≤6 yrs	77.8	22.2
	>6 yrs	64	36
ALL TEACHERS		68.6	31.4

Table 19 summarizes the data on respondents who use the SMARTBOARD based on responses to Questions 22, 23 and 24; from the responses it was determined that about two-thirds (68.6%) of teachers use the SMARTBOARD while 31.4% do not; there was no difference by school. Use of SMARTBOARD appears to be higher for male (male 81.8%, female 62.5%) and slightly higher for teachers with ≤6 years (≤6 years 77.8%, >6 years 64%). This suggests that male teachers are more likely to use the SMARTBOARD.

2.2.1 Questionnaire Section D - Course preparation with the use of the SMARTBOARD:

Table 20
Data from Survey Question 22a - Use of SMARTBOARD and Time to Prepare Lesson for 4 Hour Class – Presented in Percentages

		≤ 4 hours	>4 hours
SCHOOL	HSM	71.4	28.6
	JLAC	100	0
GENDER	Male	71.4)	28.6
	Female	83.3	16.7
EXPERIENCE	≤6 yrs	60	40
	>6 yrs	83.3	16.7
ALL TEACHERS		80	20

Question 22a - Respondents' course preparation time with use of SMARTBOARD: Table 20 summarizes the data on teachers' lesson preparation time with use of the SMARTBOARD. A large majority (80%) of teachers takes ≤ 4 hours to prepare lesson for a four hour class. The response appears to be higher for JLAC (JLAC 100%, HSM 71.4%) and slightly higher for female (female 83.3%, male 71.4%).

Table 21
Data from Survey Question 23: Responses to Percentage of the Class Time SMARTBOARS are Used – Presented in Percentages

		≤ 50%	>50%
SCHOOL	HSM	(73.3	26.7
	JLAC	71.4	28.6
GENDER	Male	77.8	28.6
	Female	69.2	30.8
EXPERIENCE	≤6 yrs	71.	28.6
	>6 yrs	75	25
ALL TEACHERS		73.4	26

Question 23 - Percentage of class time percentage of the class time SMARTBOARDs are used: The data summarized in Table 21 show that slightly over

two-thirds (73.4%) of teachers use the SMARTBOARD ≤ 50% of class time; there was no difference by school, by gender or by years of experience.

Table 22
Data from Survey Question 24: Response to Frequently of Use of SMARTBOARD in a Week – Presented in Percentages

		Not at all/ Rarely	Some Days	Most Days/ Everyday
SCHOOL	HSM	6.7	33.3	60
	JLAC	0	55.6	44.4
GENDER	Male	11.1	44.4	44.4
	Female	0	40	60
EXPERIENCE	≤6 yrs	0	57.1	42.9
	>6 yrs	6.7	40	53.3
ALL TEACHERS		4.2	41.7	54.2

Question 24 - Respondents' response to frequency of use of SMARTBOARD in a week: The data in Table 22 show that about half of teachers (54.2%) use the SMARTBOARD most days or every day, an additional 41.7% use it some days. Of teachers who use it most days/everyday, the response appears to be slightly higher for HSM (HSM 60%, JLAC 44.4%), for female (female 60%, male 44.4%) and for teachers with >6 years experience.

Table 23
Data from Survey Question 26: Respondents' Use of the SMARTBOARD Presented in Percentages

		Disagree/Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	7.1	28.6	62.3
	JLAC	22.2	22.2	55.6
GENDER	Male	12.5	12.5	75
	Female	13.3	33.3	53.3
EXPERIENCE	≤6 yrs	0	42.9	57.1
	>6 yrs	20	13.3	67.7
ALL TEACHERS		13.0	26	60.9

Question.26 - Respondent's use of the SMARTBOARD: The data in Table 26 summarizes teachers' use of the SMARTBOARD when it is available. A majority (61%) of teachers who use the SMARTBOARD use it when it is available. The response appears to be higher for males (male 75%, female 53.3%) and slightly higher for teachers with ≤6 years experience (≤6 years 67.7%, > 6 years 57.1%); however, the Chi square analysis reveals that these differences were not statistically significant (gender χ^2 = 2.696, experience χ^2 = 3.198).

Table 24
Data from Survey Question 27: Opinions on Finding Innovative Ways to Use the SMARTBOARD in Teaching– Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	67	40	53
	JLAC	11.1	11.1	77.8
GENDER	Male	11.1	11.1	77.8
	Female	67	40	53
EXPERIENCE	≤6 yrs	0	42.9	57.1
	>6 yrs	12.5	18.8	68.83
ALL TEACHERS		8.3	29.2	62.5

Question 27 - Respondents' opinions on finding innovative ways to use the SMARTBOARD: Table 24 summarizes the data providing information on whether teachers enjoy using the SMARTBOARD to find innovative ways to present course material. A majority (62.5%) of teachers agree/strongly agree that they find innovative ways to present course material. The response appears to be higher for JLAC (JLAC 77.8%, HSM 53%), and for male (male 77.8%, female 53 %) and slightly higher for teachers with >6 years experience (>6 years 68.8%, ≤ 6 years 57.1%); however, the Chi square analysis shows that these differences were not statistically significant (gender χ^2 = 2.497, experience χ^2 = 2.292).

Table 25
Data from Survey Questions 28: Opinion on Whether Setting up the SMARTBOARD is Time Consuming – Presented in Percentages

		Disagree/ Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	26.7	40	33.3
	JLAC	33.5	33.3	33.3
GENDER	Male	33.3	33.3	33.3
	Female	26.7	40	33.3
EXPERIENCE	≤6 yrs	28.6	42.9	28.6
	>6 yrs	31.3	37.5	31.3
ALL TEACHERS		29.2	37.5	33.3

Question 28 - Respondents' opinion on whether setting up the SMARTBOARD is time consuming: The data summarized in Table 25 show that one-third (33.3%) of teachers who use the SMARTBOARD find it difficult to set up every day. There appears to be no difference by school, gender and years of experience. This data suggest some level of difficulty with the use of the SMARTBOARD.

Table 26
Data from Survey Questions 29: Opinion on the Lack of Availability of Technical Support for the SMARTBOARD – Presented in Percentages

		Disagree/Strongly disagree	Neutral	Agree/ Strongly agree
SCHOOL	HSM	33.3	26.7	40
	JLAC	44.4	22.2	33.3
GENDER	Male	55.6	11.1	33.3
	Female	26.7	33.3	40
EXPERIENCE	≤6 yrs	42.9	28.6	28.6
	>6 yrs	37.5	18.8	43.8
ALL TEACHERS		37.5	25	37.5

Question 29 - Respondents' opinion on the lack of availability of technical support for the SMARTBOARD: The data summarized in Table 26 shows that slightly more than one-third (37.5%) of teachers agree/strongly agree that there is no technical support available to help when problems arise. There was no difference in response by school or by gender. The response appears to be slightly for teachers with >6 years experience (>6 years 43.8%, ≤ 6 years 28.6%); however, the Chi square analysis reveal that this difference was not statistically different ($\chi^2 = 1.338$).

2.2.2 Questionnaire Section E - Learning how to use the SMARTBOARD:

Table 27
Data from Survey Question 30: Respondent's Initial Impression of the SMARTBOARD as a Teaching /Learning Tool – Presented in Percentages

		Positive/ very positive	Neutral	Negative/ Very negative
SCHOOL	HSM	66.7	6.7	26.7
	JLAC	88.9	0	11.1
GENDER	Male	88.9	0	11.1
	Female	66.7	6.7	26.7
EXPERIENCE	≤6 yrs	100	0	0
	>6 yrs	68.8	6.3	25
ALL TEACHERS		75	4.2	20.8

Table 28
Data from Survey Question31: Time Taken for Respondents to Feel Comfortable with the SMARTBOARD – Presented in Percentages

		≤10 hours	>10 hours
SCHOOL	HSM	57.1	42.9
	JLAC	33.3	66.7
GENDER	Male	55.6	44.4
	Female	42.9	57.1
EXPERIENCE	≤6 yrs	57.1	42.9
	>6 yrs	40	60
ALL TEACHERS		47.8	52.2

Table 29
Data from Survey Question32: Whether Respondents Encountered Problems in Learning How to Use the SMARTBOARD– Presented in Percentages

		Yes	No
SCHOOL	HSM	73.3	26.6
	JLAC	77.8	22.2
GENDER	Male	66.7	33.3
	Female	80	20
EXPERIENCE	≤6 yrs	71.4	28.6
	>6 yrs	81.3	18.8
ALL TEACHERS		75	25

Questions 30 to 32 - Respondent's initial impression of the SMARTBOARD, the time to be comfortable with it and problems encountered with its use: The data summarized in Table 27 show that three-quarters (75%) of teachers who use the SMARTBOARD had a positive/very positive first impression of it as a teaching/learning tool. The response appears to be higher for JLAC (JLAC 88.9%, HSM 66.7%), for male (male 88.9%, female 66.7%) and also for teachers with ≤6 years experience (≤6 year 100%, >6 years 68.8%). The data in Table 28 show that about half (52.2%) of teachers took >10 hours to feel comfortable with the SMARTBOARD. There appears to be a

higher response for JLAC (JLAC 66.7%, HSM 42.9%), a slightly higher response for female (female 57.1%, male 44.4%), and for teachers with >6 years experience (>6 years 60%, ≤ 6 years 42.9%). The data in Table 29 show that about three-quarters (75%) of teachers encountered problems while learning how to use the SMARTBOARD. There was no difference by school. The response appears to be slightly higher for female (female 80%, male 66.7%) and for teachers with > 6 years experience (>6 years 81.3%, ≤ 6 years 71.4%).

2.2.3 Questionnaire Section F - Value of the SMARTBOARD as a pedagogical tool:

Table 30
Data from Survey Question 35: Response to How Valuable a Resource is the SMARTBOARD for a Typical Lesson - Presented in Percentages

		No value/ of little value	Somewhat valuable	Valuable/ very valuable
SCHOOL	HSM	13.3	40	46.7
	JLAC	0	33.3	66.7
GENDER	Male	11.1	33.3	55.6
	Female	6.7	33.3	53.3
EXPERIENCE	≤6 yrs	14.3	40	57.1
	>6 yrs	6.3	37.5	56.3
ALL TEACHERS		8.3	37.5	54.2

Questions 35 to 38 - Respondents' impression of the value of the SMARTBOARD as a pedagogical tool: These questions provided information of teachers' perception of the SMARTBOARD in terms of how valuable it is for teaching, its effectiveness for students' learning and motivating students, and teachers' encouragement of students' use of the SMARTBOARD. The data summarized in Table 30 show that slightly more than half (54.2%) of teachers who use the SMARTBOARD find it a valuable/very valuable resource for a typical lesson. There was no difference by gender and by years of experience. The response appears to be higher for JLAC (JLAC 66.7%, HSM 46.7%).

Table 31
Data from Survey Question 36: How Effective is the SMARTBOARD for Students' Learning - Presented in Percentages

		Very ineffective /not effective	Somewhat effective	Effective/ very effective
SCHOOL	HSM	6.7	46.7	46.7
	JLAC	0	44.4	55.6
GENDER	Male	0	44.4	55.6
	Female	6.7	46.7	46.7
EXPERIENCE	≤6 yrs	0	42.9	57.1
	>6 yrs	6.3	43.8	50
ALL TEACHERS		4.2	45.8	50

The data in Table 31 show that half (50%) of teachers find it effective/very effective for students' learning; an additional 45.8% find it somewhat effective suggesting that almost all teachers find the SMARTBOARD at least somewhat effective. There was no difference by school, by gender or by years of experience.

Table 32
Data from Survey Questions 37: How Effective is the SMARTBOARD for Motivating Students - Presented in Percentages

		Very ineffective/ not effective	Somewhat effective	Effective/ very effective
SCHOOL	HSM	0	53.3	46.7
	JLAC	0	44.4	55.6
GENDER	Male	0	55.6	44.4
	Female	0	46.7	53.5
EXPERIENCE	≤6 yrs	0	57.1	42.9
	>6 yrs	0	43.72	56.3
ALL TEACHERS		0	50	50

The data in Table 32 shows that all teachers (100%) find the SMARTBOARD at least somewhat effective; half (50%) of teachers find it effective/very effective for motivating students while the other half find it somewhat effective. There was no

difference by school or gender. The response appears to be slightly higher for teachers with >6 years experience (>6 years56.3%, ≤6 years 42.9%); however, the Chi square analysis reveal that this difference was not statistically significant ($\chi^2 = 3.145$).

Table 33
Data from Survey Question 38: Whether Respondents Encourage Students to Use the SMARTBOARD - Presented in Percentages

		Yes	No
SCHOOL	HSM	73.3	26.7
	JLAC	88.9	11.1
GENDER	Male	77.8	22.2
	Female	80	20
EXPERIENCE	≤6 yrs	100	0
	>6 yrs	75	25
ALL TEACHERS		79.2	20.8

The data in Table 33 show that a large majority (79.2%) of teachers encourage their students to use the SMARTBOARD. There was no difference by gender. The response appears to be slightly higher for JL (JL 88.9%, HSM 73.3%) and for teachers with ≤6 years experience (≤6 years 100%, >6 years 75%).

3. DISCUSSION PART 1

The results from the survey suggest that in terms of demographics, there are some gender related differences and differences relating to years of teaching experience. Females represented a higher proportion (70.6%) of completed questionnaires (males represented 29.4%); the lower proportion of male teachers was observed at both schools (HSM 33.3% males, JLAC 23.1% males). In addition, a higher proportion (72.7%) of teachers had less than 6 years of experience; 27.3 % had more than 6 years. It is likely that the higher proportion of female teachers with less than 6 years experience could reflect the demographics in Quebec's primary and secondary education system.

The data reveal that a large majority (80%) of teachers have an interest in using some form of technology in their teaching and about half (52.9%) of teachers agree/strongly agree that when available they use the SMARTBOARD in their teaching. Slightly less than one-third (30.3%) of teachers agree/strongly agree that technology can be a deterrent to some students in the classroom. Slightly less than one-third (29.4%) of teachers agreed/strongly agreed that they were always comfortable with technology; the response was higher for teachers with less than 6 years experience (≤6 years 55.6%, >6 years 20.8%) suggesting that recently hired teachers are more likely to be comfortable with technology in their teaching. These results suggest that although a large majority of teachers have an interest in the use of some form of technology in their teaching, only about one-third of teachers are comfortable with technology and only about 21% of teachers with more than 6 years experience are comfortable with technology. Only about 36 % of teachers actually try to use the latest technology; male teachers and teachers with less than 6 years are more likely to use the latest technology in their teaching. This suggests that administrators may need to pay attention to increasing the comfort level with technology and the use of the latest technology amongst teachers particularly amongst more experienced female teachers especially if this group represents a high proportion of teachers in Quebec.

Slightly less than two-thirds (64%) of teachers agree/strongly agree that they are always interested in latest pedagogical innovation; male teachers are more likely to be interested in the latest pedagogic innovation. A large majority (82%) of teachers responded that they have taken professional development courses to improve their teaching. Therefore, professional development courses might be means to encourage greater use of technology amongst teachers, particularly amongst female teachers with more than 6 years experience.

Three quarters (75%) of teachers who use the SMARTBOARD had a positive/very positive first impression of it as a teaching/learning tool; the response tended to be higher for male teachers and for teachers with less than 6 years experience. Male teachers likely use the SMARTBOARD more frequently and enjoy using it more in

their teaching compared to female teachers. With respect to difficulties that teachers encounter with use of the SMARTBOARD, one-third (33.3%) of teachers who use the SMARTBOARD agree/strongly agree that setting it up every day is time consuming, while slightly more than one-third (37.5%) agree/strongly agree that there is no technical support available to help when problems arise. This suggests that teachers might be in need of technical support to facilitate and encourage their use of the SMARTBOARD.

There is an increasing tendency for digital technology to be a part of formal education process at primary, secondary and tertiary teaching and learning institutions; this be associated with the suggestion that the digital environment supports the common theories known to educators (Adams, 2007). This increase in use of digital technology is supported by the survey data in this study which show that amongst EMSB teachers who use the SMARTBOARD, almost all teachers (96%) use it at least some days; 42% of teachers use the SMARTBOARD at least some days and 54% of teachers using it most days or every day.

4. PART 2: CLASSROOM OBSERVATIONS

Part 2 of the research was an ethnographic qualitative study of two Literacy classes (Class A, Class B) at the James Lyng Adult Centre. Class A was taught by a male teacher considered an early-adopter of the technology and described as a high-level user of the SMARTBOARD; meanwhile the female teacher for Class B was more traditional and considered as a low-level user. The enrollment in the Class A and Class B were 23 or 24 adult students, respectively. Each class was observed and video-taped for 90 minutes on the same morning for 3 consecutive days in April 2010.

The classroom observations were done the beginning of a new semester and both teachers were covering the same material; the theme was "Family". Both classes were doing vocabulary related to family, e.g. mother, father, brother, sister, grandparents, grandchildren, etc. The classes lasted approximately two hours of which the researcher spent one-and-half hours observing the classes. The observations were recorded as field

notes which consisted of a graphical recording of participatory actions based on social networks analysis techniques which is often used by sociologist to understand people's interactions while doing a normal task; . It was a way to observe whether the teachers used the teacher-centered participatory approach called Inquiry Response Evaluation (IRE) (Mehan, as cited in Renne,1996); or whether they used a more active learning approach allowing the students to participate more freely and generate their own questions (i.e., their own "inquiry").

Teacher A began his class by using stick-on pictures to show the relationships between husband, wife, and children. He then proceeded to demonstrate a picture (4 generations) of his own family which was scanned and imported on the SMARTBOARD. This family picture was used as a visual stimulus to attract students' attention about vocabulary of both immediate and extended family relationships. In addition, family pictures brought to the class by some students were scanned and imported onto the SMARTBOARD by Teacher A; this provided students the opportunity to present their families to the entire Class A. The images on the SMARTBOARD were large and visible to everyone in the classroom. The researcher observed that this gave the students the opportunity to become interactive with Teacher A's presentation; this interaction took the form of Teacher A asking questions to specific students and getting solicited responses from the specific students who were asked questions, and also getting unsolicited responses from students who responded even though they were not directly asked to answer them. At certain points in session one, several students became more engaged and generated their own questions, which they asked to the teacher or classmates. On day 3 of Teacher A's class, the teacher could not use the SMARTBOARD for about 40 minutes of the observation period because of a technical problem; during this time, it was observed that there was reduced participation from students with respect to unsolicited responses compared to days 1 and 2.

Teacher B used the same theme of "Family" but her teaching strategy was observed to be different from Teacher A; she used the more traditional practices of blackboard, chalk, handouts, and 8" x 4" pictures of students' family pictures. It was

observed that the students in Teacher B's class tended to be less interactive compared to students in Teacher A's class based on the number of solicited responses and unsolicited responses to questions.

During the classroom observations, it was noted that Teacher A (male) used the SMARTBOARD more frequently than Teacher B (female); it was estimated that Teacher A used it more than 60% of the lesson time while Teacher B used less than 10% of the lesson time. Teacher A started using the SMARTBOARD at the beginning of each lesson. The differences noted could be related to one or more of the following observations: (a) the different location of the SMARTBOARD in the two classes, (b) Teacher's A higher level of experience with the SMARTBOARD technology, or (c) the different teaching styles of the two teachers.

The SMARTBOARD of Teacher A was situated directly on the blackboard leaving blackboard space on either side of the SMARTBOARD to be used if needed; the computer was situated on one side of the classroom close enough to the SMARTBOARD and easily accessible to Teacher A. It was noted that Teacher A spent a lot of time in front of the classroom in order to use the SMARTBOARD frequently for teaching.

The two teachers whose classes were observed are considered a high-level user (Teacher A) and a low-lever user (Teacher B) of the SMARTBOARD. Honingsfeld *et al* (2009) suggest that one of the ways a high-level user teacher can integrate technology with pedagogy is by implementing curriculum plans which includes methods and strategies for technology to maximize student learning; from the classroom observations of this research, it can be proposed that Teacher A was using the SMARTBOARD with the intention to enhance student participation, with the goal of promoting learning. Mishra and Koehler (2006) suggest that technology and pedagogy can be integrated with the main focus on organization of content delivery as is demonstrated by Teacher A.

The qualitative data in the sociograms are shown in Appendix A, Figures 1 – 6, and the numerical data of response patterns obtained from the sociograms are shown in

Appendix A, Tables 1 – 6. The sociograms that were developed are the observation grids/seating plans representing the classroom settings of the two classes. A sociogram is an instrument developed by the researcher to help provide additional information regarding a student and how he/she interacts with peers. It also looks at how students respond to questions asked by their teacher or other students in the classroom. For example, S=Solicited, where the teacher solicits answers from students by directing a question to an individual student, while U=Unsolicited, means that a student answers the question, speaks out of turn, or generates a new question.

From the sociograms (Appendix A, Figures 1, 2 & 3) of Teacher A who was on the left-side of the classroom, it was noted that most of the students' participation was from the left-side of the classroom. The four male students who were seated very close to each other, along with the fifth male student, who was seated in the back row and did not consent to be in the video, dominated most of the responses in the classroom. Student BR (female) was the first student to do a presentation on day 1, after which her participation reduced noticeably. Student AA who was seated in the front-middle row close to the teacher, was one of the first to always respond to a solicited or unsolicited question; even though he responded to most of the questions asked, he never asked a question to the teacher or to a student during the three day observation. Students MF and K participated in solicited and unsolicited questioning, but also asked questions to the student or the teacher. On days 2 and 3, it was noted that student MME who also did a presentation, did a number of solicited and unsolicited responses but asked a question only once. The pattern of participation in the classroom of Teacher A demonstrated that students of same or similar culture or origin as in students AA, MF, AZ, K, and HN, tended to be more outspoken, less shy of displaying what they know; in fact, most of the students in Teacher A's classroom displayed great comfort and familiarity when using the SMARTBOARD.

In the sociograms of Teacher B, (Appendix A, Figures 3, 4 & 5) the SMARTBOARD was positioned very differently in the classroom compared to Teacher A; it was located on one side of the wall, further away from the blackboard, so the

teacher did not have access to both the blackboard and SMARTBOARD at the same time. From the researcher's anectodotal experience, this could be a deterrent to using the SMARTBOARD because of the distance away from the blackboard; it is a limitation not having access to both the SMARTBOARD and the blackboard at the same time especially when one is learning how to use it. In this classroom, the seating plan is quite different from that of Teacher A. Teacher B used the blackboard throughout the lesson period and was always positioned in front of the classroom. It was noted that students from the same country or of similar origin were allowed to sit next to each other, which accounted for more 'free-talk' in the classroom. Students only participated in the classroom when a student was doing a presentation and the question period was in progress; it was noted that the teacher asked most of the questions.

On day one, student GN (female) began the presentation and the teacher asked questions about photographs brought by the student; subsequently, it was noted that student CM was the only male student who responded, amongst male students in the class. However, on all three days that were observed, only the female students participated by speaking about their family photos. The pattern that was noticed in the sociograms in this class (Teacher B) was that, although students responded more through solicited questioning, the dynamics of class participation/engagement and motivation among students were different to that of class of Teacher A.

Table 34
Summary Table for Response Patterns from Classroom Observations

	TEACHER A			TEACHER B		
	S	U	#	S	U	#
Day 1	69 (16)	68 (9)	24 (7)	56 (19)	17 (8)	NA
Day 2	35 (10)	57 (13)	NA	60 (23)	4 (3)	NA
Day 3	91 (17)	8 (6)	NA	48 (16)	24 (8)	4 (1)
Total	195 (43)	133 (28)	24 (7)	164 (58)	45 (19)	4 (1)

Note: Numbers in parenthesis are the number of different students who participated in the different categories of responses……S=SOLICITED RESPONSES, U=UNSOLICITED RESPONSES, #=STUDENT ASK QUESTION, NA=WAS NOT OBSERVED

Table 34 summarizes the data on the solicited responses and unsolicited from students in the classes of Teachers A and B during the 3-day observation period; the numbers in parentheses are the number of students who gave that particular category of responses. Over the 3-day observation period, there were more student responses in the class of Teacher A (195 solicited, 133 unsolicited) than in the class of Teacher B (164 solicited, 45 unsolicited). For Teacher A, the lower number of unsolicited responses in day 3 was related to the fact that there were some technical problems with the SMARTBOARD and the teacher could not continue with lesson. While he attempted to fix it, students were assigned to reading exercises. As the frustrated teacher was quoted "this is an excellent tool, but it can let you down in the middle of a lesson, and if you don't know how to fix it, you can lose your day trying." The results from the table show that for Teacher B who used the SMARTBOARD only about 10% of the class time, the number of unsolicited responses was lower than solicited responses on all three days. Even though she demonstrated good pedagogical skills, the students were not as engaged or motivated in comparison to the other students.

Hence, these results suggest that based on the number of responses over the 3-day observation period there was more students' participation, particularly with unsolicited responses in the class taught by the high-level user of the SMARTBOARD compared to the class taught by the low-level user of the SMARTBOARD. This observation of more student participation in the class taught with the high-level user of the SMARTBOARD is supported by reports by other researchers. Rochette (2007) suggests that the SMARTBOARD lends itself more to student participation compared to the blackboard or overhead projector. Kennewell and Beauchamp (2007) also suggest that there are positive benefits in students' participation with use of the SMARTBOARD compared with a blackboard or overhead projector, and that the SMARTBOARD is designed to engage and motivate students during the learning process.

The total number of solicited responses (S) over the 3-day observation period was 195; the total number of solicited responses (S) was 164 for the class of Teacher B. The total number of students who responded in the solicited category was 58 for the class of Teacher B and 43 for the class of Teacher A. This suggests that based on total responses and number of students responding, students' responses solicited by the teacher was higher in the class taught by the low-level user of the SMARTBOARD (Teacher B); this could be an indication that participation by students in this class is associated more with questions directly asked by the teacher. The number of unsolicited responses (U) over the 3-day observation period was 133 for the class of Teacher A; the number of unsolicited responses (U) was 45 for the class of Teacher B. The amount of students who responded in the unsolicited category was 19 for the class of Teacher B and 28 for the class of Teacher A. This suggests that students' responses unsolicited by the teacher was higher in the class taught by the high-level user of the SMARTBOARD (Teacher A); this could be an indication that students in this class pay more attention and are more engaged in the lesson that is being taught and are more motivated to respond without being asked questions by the teacher and could be retaining more of the information presented by the teacher. It should be noted from sociograms (Appendix A, Figures 1 to 3) that the unsolicited responses in the class of Teacher A came predominantly from a few students

(AA, BR, MME, and MF); it is likely that these students more responded more because they were involved in a presentation.

5. DISCUSSION: PART 2

The results presented above suggest that in the class in which the SMARTBOARD was used, the students appeared to be more engaged and more motivated based on the unsolicited responses; From the classroom observations of Teacher A, it appears that the SMARTBOARD provided greater opportunity for student to participate for the theme "Family", and therefore can enhance the learning through experiences such as: "learning by doing" or "learning by seeing" (Bruner & Olson, 1973, as cited in Solvie & Kloek, 2007). This is supported by the classroom observations which revealed that on the few occasions when the SMARTBOARD was used by Teacher B, students were more engaged than when it was not used. Several researchers have reported on this aspect of technology and pedagogy. Armstrong *et al*, (2005) suggest that teachers can create a motivating atmosphere in the classroom if they have the training and ability to use software technology and that use of the SMARTBOARD promoted an interaction between instructors and learners including the development of social skills in the interaction; this is consistent with constructivism and social constructivism concepts. Atkinson (2000) suggests that student engagement is a critical aspect of student motivation and that there is evidence to suggest relationships between students' motivation, performance and learning styles. Somekh and Davis (1997) reported that use of digital technology such as the SMARTBOARD can improve student motivation. Beane (1997) and Newell (1994) suggest that with the use of the SMARTBOARD students can be exposed to a constructivist approach through activities like engaging and reflecting, annotating, questioning, answering, discussing and problem solving.

Another way of looking at these results is to consider the impact of the students' cultural differences. In this research, it was assumed that students' culture was not a confounding factor and the class 'micro-culture' compensated for students' individual cultural differences; this could be a subject for further research.

6. SURVEY INFORMATION ON PEDAGOGY IN RELATION TO CLASSROOM OBSERVATIONS ON USE OF SMARTBOARD

From the teachers survey covered in Part 1 (questions 16, 17, 35, 36 and 37) we learned about how teachers viewed the role of technology and the SMARTBOARD on pedagogic aspects such as students' participation and overall learning. From the 3-day classroom observations, covered in Part 2, we learned how use of the SMARTBOARD affected the teacher's pedagogy, and the effect this had on students' participation, motivation and general classroom practice, as measured by the students' response patterns.

In summary, the questionnaire shows that half of teachers who used the SMARTBOARD found it effective for students' learning; and additional 45.8% found it somewhat effective. Half of teachers found it effective for motivating students; an additional 50% found it somewhat effective. A large majority (79.2%) of teachers encourage their students to use the SMARTBOARD. Also from the questionnaire we learn that, half of teachers of teachers agreed that use of technology was important for encouraging students' participation. The large majority (80%) of teachers believe that their students need to be active participants in order to learn. Also, a large majority (85%) saw the SMARTBOARD as a valuable resource for their lessons. Almost everyone (97%) believed that the SMARTBOARD is effective for students' learning and for motivating students.

In summary, the classroom observations in Part 2 suggest that the high-level of use of the SMARTBOARD had adapted his teaching to take advantage of the affordances of the technology for promoting student engagement. His activities were different than the other teacher and the results showed that his students enjoyed this change. These results are consistent with the survey data which showed that the teachers who used the SMARTBOARD also saw that the technology encourages greater students participation, engagement and motivation to learn.

CHAPTER FIVE
CONCLUSION

The results from this study suggest that teachers' use of the SMARTBOARD in the classroom can have some positive outcomes on students' participation and learning in these classes. Based on the survey of teachers, it can be concluded that although most teachers are interested in and use some form of technology in their teaching, there are some gender related differences and differences relating to years of teaching experience in relation to the use of technology and the SMARTBOARD in teaching. Male teachers and teachers with less than 6 years are more likely to use the latest technology in their teaching and have of positive first impression of the SMARTBOARD as a teaching/learning tool. Teachers with more than 6 years experience are more likely to be comfortable with technology in their teaching while male teachers are more likely to use the SMARTBOARD when it is available, seem to use it more frequently and enjoy using it more in their teaching.

From the classroom observations of students' response patterns with and without the use of the SMARTBOARD, it can be concluded that there is a tendency for higher student participation, engagement and motivation amongst students in a class taught with greater use of the SMARTBOARD. Research published by other researchers suggests that the use of the SMARTBOARD can enhance student learning. Teachers' responses to the survey also indicate that the use of the SMARTBOARD can be effective in students' learning, engagement and motivation, supporting the information on students' response pattern obtained from the 3-day classroom observation. As a suggestion for future study, it will be of interest to investigate whether these classroom observations are related to students' cultural differences.

From teachers' responses to the survey questionnaire, and the researchers' observations in the classroom, in general, it is reasonable to suggest that the SMARTBOARD can have multiple benefits for both teaching and learning; the technology can be used in many different ways where it addresses all the learning styles

in a classroom. For those students who have different learning styles, such as visual learners, or for those who have limited language skills the SMARTBOARD can be a very useful tool. The visibility of the board allows students to engage in the learning as a whole-group that is more collaborative and active in comparison to the traditional lessons that have a tendency to be more passive and teacher-centered.

The results from this research demonstrate a generally positive attitude by teachers towards the use of the SMARTBOARD and a generally positive role of this technology in enhancing student learning while engaging them in the learning process. Based on the results of this study, there are many issues related to the use of the SMARTBOARD in the classroom that still need to be examined. One point in particular is whether teachers feel adequately trained to integrate SMARTBOARD technology into their curricula. And, whether the gender difference revealed is related to other factors like a need for more support, other responsibilities, or a general sense of anxiety when it comes to technology. Having a SMARTBOARD in the classroom is an asset for the teacher only if that teacher is able to use it effectively. Greater opportunity for training and ongoing technical support may be one way to increase teacher use of the SMARTBOARD; with particular attention to teachers who have been teaching for a substantial number of years and may therefore be older. Lastly, there may be reason to address a gender factor when it comes to the adoption of this technology. Perhaps female teachers may require a different incentive to take up this technology. Perhaps technology training needs to be more gender sensitive.

BIBLIOGRAPHICAL REFERENCES

Adams, N.B. (2007). Toward a model for knowledge development in virtual environments: Strategies for Student Ownership. *International Journal of Social Sciences*, Special Issue on Virtual Learning Environments. Retrieved December 2, 2008. http://www.waset.org/ijss/v2/v2-2-11.pdf. . http://www2.selu.edu

Adrian, B. F. (2004). Incorporating the SMARTBOARD for Smart Teaching. *Tech Learning*. Retrieved November 29, 2008, http://www.techlearning.com/showArticle.php?articleID=512000657

Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., & Thompson, I. (2005). Collaborative research methodology for investigating teaching and learning: the use of interactive whiteboard technology. *Educational Review,* 57 (4), 457-466.

Atkinson, E.S. (2000). An investigation into the relationship between teacher motivation and pupil motivation. *Education Phsychology,* 20(1), 45-57.

Baxter Magolda, M. (1992). Teaching responsively to different ways of knowing. In: *Knowing and Reasoning in College: Gender-Related patterns on Students' Intellectual Development* (pp. 227-268). San Francisco. CA: Jossey-Bass.

Beane, J.A. (1997). *Curriculum integration*: *Designing the core of democratic education.* New York: Teachers College Press. Chapter 1: A special kind of unity (pp. 1-18).

Bransford, J., Brown, A., & Cocking, R. (2000). *How People Learn: Brain, Mind, and Experience & School.* Washington, DC: National Academy Press.

Butler-Pascoe, E. M., & Wiburg, M. K. (2003). Technology and Teaching English Language Learners. Allyn & Bacon. USA

Bruner, J. (1996). The Culture of Education, Cambridge, MA: Harvard University Press.

Dewey, J. (1938/1997). *Experience and education.* New York: MacMillan Publishing Co.

Fellingham, L. (2006). An evaluation of cutting edge digital. Its effectiveness in supporting contemporary methodology. *Language& Communication Review*, 5 (1), 25-30. Retrieved from Google, December 2, 2008. http://www.stets.org.sg/Vol5N1_2006_25to30fellingham.pdf.

Gibson, J.J. (1977). The Theory of Affordances. *In Perceiving Acting and Knowing*. Eds. Robert Shaw and John Bransford.

Good, T., & Brophy, J.E. (1987). Looking in Classrooms. New York Harper and Row.

Hodge, S., & Anderson, B. (2007). Teaching and learning with an interactive whiteboard: a teacher's journey. *Learning, Media and Technology,* 32(3), 271. Retrieved November 30, 2008, from McGill Research Library database. (Document ID: 1319841911).

Honigsfeld, A., Giouroukakis, V., Cohan, A., & Walsh, M. (2009). Ten ways to incorporate technology into a TESOL teacher preparation program. *Contemporary Issues in Technology and Teacher Education, 9*(2). Retrieved from http://www.citejournal.org/vol9/iss2/currentpractice/article1.cfm

Järvelä, S., Järvenoja, H., & Veermans, M. (2008). Understanding the dynamics of motivation in socially shared learning. *International Journal of Educational Research* 47, 122–135.

Kennewell, S., & Beauchamp, G. (2007).The features of interactive whiteboards and their influence on learning. *Learning, Media and Technology*, 32(3), 227-241. Retrieved November 30, 2008, from McGill Research Library database. (Document ID: 1319841871).

Knight, P., Pennant, J., & Piggott, J. (2005). The power of the Interactive Whiteboard. *Micromath*, 21(2), 11-15. Retrieved December 4, 2008, from Research Library database. (Document ID: 875323491). http://proquest.umi.com/pqdweb?did=875323491&sid=4&Fmt=3&clientId=10843&RQT=309&VName=PQD

Lowenthal, P., & Muth, R. (2008). Constructivism. In E. F. Provenzo, Jr. (Ed.), *Encyclopedia of the social and cultural foundations of education.* Thousand Oaks, CA: Sage.

McNeese, M. (2006). The2006 report on the Faculty Technology Survey at the University of Southern Mississippi. Retrieved February, 2007 from: smarterkids.org/research/pdf/McNeese-SB%20Evaluation.pdf

Miller, D., Averis, D., Door, V., & Glover, D. (2004). Becta ICT Research Bursary 2003-2004 final report from technology to professional development: How can the use of an interactive whiteboard enhance the nature of teaching and learning in secondary mathematics and modern languages? ICT Research Bursary. Retrieved January 5, 2009. http://partners.becta.org.uk/upload-dir/downloads/pagedocuments/research/bursaries05/interactive whiteboard.pdf

Miller, D., & Glover, D. (2007). Into the unknown: the professional development induction experience of secondary mathematics teachers using interactive whiteboard technology. *Learning, Media and Technology*, 32(3), 319. Retrieved November 30, 2008, from McGill Research Library database. (Document ID: 1319841881).

Mishra, P., & Koehler, M.J. (2006). Technological Pedagogical Content Knowledge: *A Framework for Teacher Knowledge.* 108 (6)1017-1054.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education, 3* (2), 1-6.

Morris, L. (1998), Those who can, teach. A guide to TESL in Quebec. Concordia University Bookstore Custom Publishing Program, pp. 166-172.

Newell, W.H. (1994). Designing interdisciplinary courses. *New Directions for teaching and Learning,* 58, pp. 35-51.

Painter, D.D. (2005).The use of an Interactive Whiteboard in Promoting Interactive Teaching and Learning.

Piaget, J. (1990). *The child's conception of the world.* New York: Littlefield Adams.

Renne, C.G. (1996). Structuring classroom lessons: *Attempts to incorporate student questions and initiatives during math lessons.* Teacher Education Quarterly. Spring 1996, pp.1-18.

Rochette, L.C. (2007). What classroom technology has taught me about curriculum, teaching, and infinite possibilities. National Council of Teachers of English. *English Journal.*97 (2) 43-48.

Rogers, E.M. (1962). *Diffusion of Innovations.* Free Press of Glencoe, Macmillan Company.

Schroeder, R. (2007). Active learning with interactive whiteboards. A literature review and a case study for college freshmen. *Communications in information Literacy.* 1 (2). Retrieved November 29, 2008. http://www.comminfolit.org/index.php/cil/article/viewArticle/Fall20008

Shanley, J. (2007). Virtual Inc. Online video clip. How the Interactive Whiteboard is affecting learning. March 31, 2009.

SMART Technologies Inc. (2006). Interactive Whiteboards and Learning. *Improving student learning outcomes and streamlining lesson planning.* White Paper.

Somekh, E., & Davis, N. (1997). Using Information Technology effectively in Teaching and Learning. *Studies in pre-service and in-service teacher education.* Routledge, London. (1-259) (ISBN 0-415-12131-0).

Solvie, P. A. (2004). The digital whiteboard: A tool in early literacy instruction. *Reading Teacher,* 57, (5), 484-7.

Solvie, P. A., & Kloek, M. (2007). Using technology tools to engage students with multiple learning styles in a constructivist learning environment. *Contemporary issues in technology and teacher education* (Online serial), 7(2). Available: http://www.citejournal.org/vol7/iss2/languagearts/article1.cfm

Warschauer, M., & Meskill, C. (2000). Technology and Second Language Teaching and Learning. In J. Rosenthal (ed) Handbook of Undergraduate Second Language Education. Mahwah, NJ: Lawrence Erlbaum.

Vygotsky, L.S. (1978). Mind and society: The *development of higher mental processes.* Cambridge, MA: Harvard University Press.

APPENDIX A

FIGURES AND TABLES OF SOCIOGRAM

FIGURE 1

SOCIOGRAM FOR CLASS OF TEACHER A - APRIL 21, 2010

S= SOLICITED QUESTION, **U=UNSOLICITED, F=FREE TALK**, //=STUDENT ASK QUESTION,
NS=NO RESPONSE TO SOLICITED QUESTION

SMARTBOARD

Left-side				Right-side	
K: U19, U20, U22, #2, #3, #4, **U24, U26, F7, U32, U39**, S54, #19, #21, **U55, U59, U60** **AFGAN. (M)**	**AA: U1, U2, U3,U4, U7, U8, U10, U11, U12, U13, U16, U17, U18, U21**, #6, **U23**, S20,**U27, U38**, S46, S47, S49, S51, S52, S53,S55,S56, S57, S59, S60, S62, S63, S64, **U49**, S65,**F15, U53, U58, U61, U62** **IRAQ (M)**	**HN:** ABSENT NO PICTURE **IRAQ (F)**		**HXY: F2**, S14, S34, NS4 **CHINA (F)**	**JSX: F3**, S33,NS3 **CHINA (F)**
ZF: CHINA (F) F4, U27,	**MF:** #1, **U5, U6, U9, U14**, #5, **U25**, #7,S36, S37, **U28, U29, U30, U31, U34, U37, U40, U41**, #15, #16, **U43**, S58, **U47**, #23, **S66, U50, F16, U56, U52,** **AFGAN. (M)**	**TD: CHINA (M)** S2, S13, S32,NS2, S44, S50		**AMT:** S4 **ETHIOPIA (F)**	**MME:** S3, **U36,** #23 **CONGO (F)**
	AZL: U15, U22, U46, U48, U51 **IRAQ (M)**	**LMY:** S35, S40, S42, S61 **CHINA (F)**		**ZML: U44, U45**, S68, S69 **CHINA (F)**	**JXF:** #10, S32, #12, S44, #12, **F8**, #17, F12, #18, #20, #22 **CHINA (F)**
BR: S1, **F1, F6**, S5, S6, S7, S8, S9, S10, S15, S16, S17, S21, NS1, S22, S23, S24, S27, U28, S29, 230, S38, S39, **F9, F10**, S48,**U42, F13, U53** **BANGLADESH. (F)**	**ST: F5**, S19 **RUSSIA (F)**	**AB:F14** **ROMANIA (M)**		**HCK:**S11, S12, S18, **F9, F11** **HONG KONG(M)**	**OA:** **MOLDOVA (M)**
	JXF: **CHINA (F)**			**SO:** #14, S45 NO PICTURE **RUSSIAN(F)**	**HN:** S25, S26, #8, #9,S31,S41, #11, **U33, U35, U36,**S67, **U52, U54** NO PICTURE **IRAQ (M)**

TABLE 1
SUMMARY OF THE DATA IN FIGURE 1
(TEACHER A - APRIL 21, 2010)

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK**, # =STUDENT ASK QUESTION, NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.	# STUDENT ASK QUESTION	FREE T.	NS.
AA	IRAQ, ARABIC	M	16	22	1	1	
AB	ROMANIA	M				1	
AZL	IRAQ, ARABIC	M		5			
AS	IRAQ, ARABIC	F	ABSENT				
AMT	ETHIOPIA	F	1				
BR	BANGLADESH	F	21	3		1	1
HN	IRAQ, ARAB IC	M	5	5	3		
HXY	CHINA, CHINEESE	F	2			1	1
HCK	HONG KONG, CHINESE	M	3			2	
IC	CONGO	F	ABSENT				
LMY	CHINA, CHINESE	F	4				
MF	AFGHANISGTAN	M	3	19	6	1	
MME	CONGO	F	1	1	1		
OA	MOLDOVA	M	ABSENT				
ST	RUSSIA	F	1			1	
SO	RUSSIA	F	1		1		
ZF	CHINA, CHINEESE	F		1		1	
ZJ	CHINA, CHINEESE	F	ABSENT				
TD	CHINA, CHINEESE	M	5				1
ZML	CHINA, CHINEESE	F	2	2			
JXF	CHINA, CHINEESE	F	2		7		1
K	AFGANISTAN	M	1	10	5	1	
JSX	CHINA, CHINEESE	F	1			1	1
	TOTAL RESPONSES		69	68	24	11	5

FIGURE 2

SOCIOGRAM FOR CLASS OF TEACHER A - APRIL 22, 2010

S=SOLICITED, U=UNSOLICITED, F=FREE TALK, NS=NO RESPONSE TO SOLICITED QUESTION

K : ABSENT **AFGHANISTAN (M)**	**AA: U5, U11, U14, U20, U23, U25 U34, U39, F48, U37, U38, U39, U41, U43** **IRAQ (M)**	STUDENT SITS IN BACK, DOES NOT WANT TO BE IN THE VIDEO		**HXY: ABSENT** **CHINA (F)**	**JSX:** S14 **CHINA (F)**
ZF: U35, U36 **CHINA (F)**	**MF: U1, U10, U15, U26, U30, U40, U35, U36, U38, F49** **AFGANISTAN (M)**	**TD: U3, U6,** S33, **F39, F45** **CHINA (M)**		**AMT:** S2 **ETHIOPIA (F)**	**MME:** S1 **F5,U4** S34, **U20, U22,** S35, **U24,** S36, S37, S38, S39, S40, **U27, U28, U32, U33, U34,** S35, S42, S43 **CONGO (F)**
ZJ: S3, **U3, U8, U9, U17, U29, F36, F38, F42, F44, 46** **CHINA (F)**	**AZL: F9, F11, F18, F19, F21, U18, F43, U37,**S44, **F50,** S46, **U42** **IRAQ (M)**	**LMY:** S5, **F20** **CHINA (F)**		**ZML: F6, F30** **CHINA (F)**	STUDENT SITS IN BACK, DOES NOT WANT TO BE IN THE VIDEO
BR: S32, **F22, U19, U40** **BANGLADESH (F)**	**ST:** S13, **F23** **RUSSIA (F)**	**JXF: F2, F4, F8, F18, U16, F24, F26, F28, F37, F47** **CHINA (F)**		**HCK: F1,F3,F7,F17, U12,F25,F27,U27, F29, U31, F40, F41** **HONG KONG (M)**	**OA:** S4, **U2, U13,** S45 **MOLDOVA (M)**
				AS: **IRAQ (F)** NO PICTURE	**HN: F10, F12, U2, U4, U7** **IRAQ (M)** NO PICTURE

TABLE 2
SUMMARY OF THE DATA IN FIGURE 2
(TEACHER A - APRIL 22, 2010)

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK,** NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.	FREE T.	NS.
AA	IRAQ, ARABIC	M		13	1	
AB	ROMANIA,	M				
AZL	IRAQ, ARABIC	M	2	3	7	
AS	IRAQ, ARABIC	F				
AMT	ETHIOPIA,	F	1		1	
BR	BANGLADESH	F	1	2	1	
HN	IRAQ, ARAB IC	M		3	2	
HXY	CHINA, CHINEESE	F		3	2	
HCK	HONG KONG, CHINEESE	M		3	9	
IC	CONGO	F				
LMY	CHINA, CHINESE	F	1			
MF	AFGHANISGTAN	M		9	1	
MME	CONGO,	F	11	9	1	
OA	MOLDOVA,	M	2	2		
ST	RUSSIA, RUSSIAN	F	1		11	
SO	RUSSIA, RUSSIAN	F				
ZF	CHINA, CHINEESE	F		2		
ZJ	CHINA, CHINEESE	F	1	5	5	
TD	CHINA, CHINEESE	M	1	2	2	
ZML	CHINA, CHINEESE	F			2	
JXF	CHINA, CHINEESE	F		1	9	
K	AFGANISTAN	M				
JSX	CHINA, CHINEESE	F	14			
	TOTAL RESPONSES		35	57	54	

FIGURE 3
SOCIOGRAM FOR CLASS OF TEACHER A - APRIL 23, 2010

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK**, # = STUDENT ASK QUESTION,, NS=NO RESPONSE TO SOLICITED QUESTION

ZML: S10, S33, S34, S39, S40, S80 **CHINA (F)**	**AA:** S1, S21, S23, **U4**, S25, 235, S38, **F8**, S52, S82, S91 **IRAQ (M)**	**HXY:**S11, S30, S85, S87 **CHINA (F)**		**K:** S18, S19, S20, S50, **F4**, S81, S89 **AFGANISTAN (M)**	**JSX:** S6, S24, **F5**, S56, S84, S90 **CHINA (F)**
ZF: F3, S54, S63, S67, S68, S93 **CHINA (F)**	**MF:** S22, **U3**, S42 **AFGANISTAN (M)**	**IC:** S7, S37, S71, S73 **CONGO (F)**		**AMT:** S2, **U2**, S26, S44, S46, **U8,F9**, S65,S86 **ETHIOPIA (F)**	**TD:** S7, S17 **U1**, S27, S28, S45, S49, S59, S88 **CHINA (M)**
BR: S8, S15, **U5**, S29, S41, **F2**. S66, S75, S80 **BANGADESH (F)**	**AZL:** S18, S32, S43 **IRAQ (M)**	**LMY:** S3, S12, **U6, U7**, S36 **CHINA (F)**		**HCK:** S76, S77, S78, S79, S92 **HONG KONG (M)**	**MME:** S2, S16, S31, S47, **F1**, S53, S62, S70, S72, S88 **CONGO (F)**
JXF: S9, **F6**, S61, S66, S69 **CHINA (F)**	**OA:** S5, S14, S48, S74 **MOLDOVA (M)**				
				AS: **IRAQ (F)** NO PICTURE	**HN:** **IRAQ (M)** NO PICTURE

TABLE 3
SUMMARY OF THE DATA IN FIGURE 3
(TEACHER A - APRIL 23, 2010)

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK,** NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.	FREE T.	NS.
AA	IRAQ, ARABIC	M	9	1	1	
AB	ROMANIA,	M				
AZL	IRAQ, ARABIC	M	3			
AS	IRAQ, ARABIC	F				
AMT	ETHIOPIA,	F	6	2	1	
BR	BANGLADESH	F	7	1	1	
HN	IRAQ, ARAB IC	M				
HXY	CHINA, CHINEESE	F	4			
HCK	HONG KONG, CHINESE	M	5			
IC	CONGO	F	4			
LMY	CHINA, CHINESE	F	3	2		
MF	AFGHANISGTAN	M	2	1		
MME	CONGO,	F	10			
OA	MOLDOVA	M	4			
ST	RUSSIA	F				
SO	RUSSIA, RUSSIAN	F				
ZF	CHINA, CHINEESE	F	5		1	
ZJ	CHINA	F				
TD	CHINA, CHINEESE	M	8	1		
ZML	CHINA, CHINEESE	F	6			
JXF	CHINA, CHINEESE	F	4		1	
K	AFGANISTAN	M	6		1	
JSX	CHINA, CHINEESE	F	5		1	
23	**TOTAL RESPONSES**		91	8	7	

FIGURE 4

SOCIOGRAM FOR CLASS OF TEACHER B- APRIL 21, 2010

S=SOLICITED, U=UNSOLICITED, F=FREE TALK, NS=NO RESPONSE TO SOLICITED QUESTION

WH: S49, **CHINA (F)**	**SD:** S18, **F14, F16,** **RUSSIA (M)**	**GV:** S7, **F15, F17,** S48 **NICA-RAGUA (F)**	**AF:** S47, **IRAN (F)**	**CM:** S3, **U7,** S9, **F3,** S22, **U13,** S29, **U15,** S46, **IRAN (M)**	**ONJ: U5,** S5, S8, **F4, U9,**S30, S32, S33 **GONGO (F)**	**SB:** ABSENT **IRAQ (F)**	**GN:** S1, S2, S6, S19, S25, S34 **IRAN (F)**
	NN: S6, S27, S43, S44, S45, **UKRAINE (F)**	**LH: 7, F22,** S42, **CHINA (F)**	**ZYQ:** S21, **U12, F12, F18, F21,** S40, S41, **CHINA (M)**	**JJR: U1, U2, U8,,**S10, **U10, U11, U12,** S24, S28, S31, **F13, F19,** S34 **CHINA (F)**	**SL:** **UKRAINE (F)**	**NIR:** S34 **CONGO (F)**	**XSX:** S4, S14, **U12,** S36 **CHINA (F)**
	MK: S11, S17, **UKRAINE (F)**	**LLX: F1, U5, U6,** S26, F24, S50, S51, S52, S53, **CHINA (F)**	**TS: F2, F11, F19, F26** **MOROCCO (F)**			**FO: U3, F1,** S12, S16, **F4, F6, F8, F9, F10, F27,** **RUSSIA, (F)**	**LM: U4, F2,** S13, S15, **F5, F7, U14, F11,** S35, S37, S38, **F28** **MOLDOVA (F)**
	DLH: F23, S54 **CHINA (F)**	**BC:** S20, **F10, F20,** S55, **F25** **ALGERIA (F)**					

TABLE 4
SUMMARY OF THE DATA IN FIGURE 4
(TEACHER B - APRIL 21, 2010)

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK,** NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.		FREE T.	NS.
CCH	TAIWAN, CHINEESE	M					
DLH	CHINA, CHINEESE	F	1			1	
FO	RUSSIA, RUSSIAN	F	2	1		7	
GN	IRAN, FARSI	F	6				
JJR	CHINA, CHINEESE	F	5	5		2	
LH	CHINA, CHINEESE	F	2			1	
LLX	CHINA, CHINEESE	F	5	2		2	
LM	MOLDOVA	F	5	2		5	
MK	UKRAINE	F	2				
NN	UKRAINE,	F	5				
CM	IRAN, FARSI	M	5	3		1	
PMM	PERU,	F					
SD	RUSSIA, RUSSIAN	M	1			2	
WH	CHINA, CHINEESE	F	1				
XSX	CHINA, CHINEESE	M	3	1			
GV	NICARAGUA, SPANISH	F	2			2	
ONJ	CONGO,	F	5	2		1	
SB	IRAQ, ARABIC	F					
TS	MOROCCO, ARABIC/FRENCH	F				3	
ZYQ	CHINA, CHINEESE	M	3	1		3	
SL	UKRAINE,	F					
AF	IRAN, FARSI	F	1				
NIR	CONGO	F	1				
BC	ALGERIA, ARABIC/FRENCH	F	1			4	
24	**TOTAL RESPONSES**		56	17		34	

FIGURE 5
SOCIOGRAM FOR CLASS OF TEACHER B- APRIL 22, 2010

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK**, NS=NO RESPONSE TO SOLICITED QUESTION

WH: S5, S29, S35, S57 **CHINA (F)**	**SD:** S4, **F5,** S34 **RUSSIA (M)**	**GV:** S3, S30 **NICARAGUA (F)**	**AF:** S7, S14, S38,S45 **IRAN (F)**	**CM: NS1,** S13, **F20, NS2,** S44, S50 **IRAN (M)**	**ONJ: S8, F10, F21,** S39, **F17,** S51, **F22** **GONGO (F)**	**SB: F9,** S28, S56, **F23** **IRAQ (F)**	**GN:** S9, S12, **F4,** S41, S43 **IRAN (F)**
	NN: U1, S5, S10, **F6,** S36, **F20** **UKRAINE (F)**	**LH:** S2, **F7,** S24, **CHINA (F)**	**ZYQ:** S15, **F8,**S25, **F18** **CHINA (M)**	**JJR:** S26 **CHINA (F)**	**SL:** S22, S31, S51, S58 **UKRAINE (F)**	**NIR:** S54 **CONGO (F)**	**XSX:** S11, S27, **U3, U4,** S55 **CHINA (F)**
	MK: S23, **F21** **UKRAINE (F)**	**LLX:** S8, S19,S40, **F19,** S49 **CHINA (F)**	**CCH:** S53 **CHINA (M)**			**FO:** S1, **F4, F12, F12, F14,** S32 **RUSSIA, (F)**	**LM:** S6, **F3, F13, F15, S37** **MOLDOVA (F)**
	DLH: S16, S18, S46, S48, S52 **CHINA (F)**	**BC: U2, F1,** S17, **F17,** S33, S47 **ALGERIA (F)**	**TS:** S10, **F2, F16,** S42 **MOROCCO (F)**				

TABLE 5
SUMMARY OF THE DATA IN FIGURE 5
(TEACHER B - APRIL 22, 2010)

S=SOLICITED, **U=UNSOLICITED, F=FREE TALK,** NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.	FREE T.	NS.
CCH	CHINA, CHINEESE	M	1			
DLH	CHINA, CHINEESE	F	5			
FO	RUSSIA, RUSSIAN	F	2		4	
GN	IRAN, FARSI	F	4			
JJR	CHINA, CHINEESE	F	1			
LH	CHINA, CHINEESE	F	3		1	
LLX	CHINA, CHINEESE	F	4		1	
LM	MOLDOVA	F	1		4	
MK	UKRAINE,	F	1		1	
NN	UKRAINE,	F	3	1	2	
CM	IRAN, FARSI	M	3		1	2
PMM	PERU,	F				
SD	RUSSIA, RUSSIAN	M	2		1	
WH	CHINA, CHINEESE	F	4			
XSX	CHINA, CHINEESE	M	3	2		
GV	NICARAGUA, SPANISH	F	2			
ONJ	CONGO,	F	3		4	
SB	IRAQ, ARABIC	F	2		2	
TS	MOROCCO, ARABIC/FRENCH	F	2		2	
ZYQ	CHINA, CHINEESE	M	2		2	
SL	UKRAINE,	F	4			
AF	IRAN, FARSI	F	4			
NIR	CONGO	F	1			
BC	ALGERIA, ARABIC/FRENCH	F	3	1	2	
	TOTAL RESPONSES		60	4	27	2

FIGURE 6

SOCIOGRAM FOR CLASS OF TEACHER B - APRIL 23, 2010

S=SOLICITED, U=UNSOLICITED, F=FREE TALK, # = STUDENT ASK QUESTION, NS=NO RESPONSE TO SOLICITED QUESTION

WH: S22 CHINA (F)	SD: S21, F10 RUSSIA (M)	GV: F11 NICARA-GUA (F)	AF: ABSENT IRAN (F)	CM: S5, #1, #2, #3, #4, IRAN (M)	ONJ: ABSENT GONGO (F)	SB: ABSENT IRAQ (F)	GN: S6, S15, S16, S17, U4, U5, U6, U7, F9, F13 IRAN (F)
	NN:F21 UKRAINE (F)	LH: F5, S40, F23 CHINA (F)	ZYQ: F6, F24, CHINA (M)	JJR: S4, F7, U8, U9 CHINA (F)	SL: S19, F8 UKRAINE (F)	NIR: U13,S27, S28, CONGO (F)	
	MK: S2, S20, S29,U14, U15, U16, S30, F22 UKRAINE (F)	LLX: S3,F3,S39, S40, S41, S42, S43, S44, U18, U19, U20, S41 CHINA (F)	CCH: F4, F20 CHINA (M)	XSX: S23 CHINA (F)		FO: F1, S7, S8, S9, S10,U1, S11, S12,U2, U3, S13, S14,F14, F16, F17, F19 RUSSIA, (F)	LM: F2, S18,S24,U10, S25, S26, U11, U12, F15 MOLDOVA (F)
	DLH: S1, S31, S32, S33, S34, S35 CHINA (F)	BC: S36,U17, U18, U19, U20,S37, S38, U18,S39, F24 ALGERIA (F)	TS: S36, F18, F23 MOROCCO (F)				

TABLE 6
SUMMARY OF THE DATA IN FIGURE 6
(TEACHER B - APRIL 23, 2010)
S=SOLICITED, U=UNSOLICITED, F=FREE TALK,
 # = STUDENT ASK QUESTION,
NS=NO RESPONSE TO SOLICITED QUESTION

STUDENT	COUNTRY + LANGUAGE	SEX	SOL.	UNSOL.	# STUDENT ASK QUESTION	FREE T.	NS.
CCH	TAIWAN, CHINEESE	M				2	
DLH	CHINA, CHINEESE	F	6				
FO	RUSSIA, RUSSIAN	F	8	3		5	
GN	IRAN, FARSI	F	3	4		2	
JJR	CHINA, CHINEESE	F	1	2		1	
LH	CHINA, CHINEESE	F	1			2	
LLX	CHINA, CHINEESE	F	8	3		1	
LM	MOLDOVA	F	4	3		2	
MK	UKRAINE	F	4	3		1	
NN	UKRAINE,	F				1	
CM	IRAN, FARSI	M	1		4		
PMM	PERU,	F					
SD	RUSSIA, RUSSIAN	M	2			1	
WH	CHINA, CHINEESE	F	1				
XSX	CHINA, CHINEESE	M	1				
GV	NICARAGUA, SPANISH	F				1	
ONJ	CONGO,	F	AB	AB	AB	AB	AB
SB	IRAQ, ARABIC	F	AB	AB	AB	AB	AB
TS	MOROCCO, ARABIC/FRENCH	F	1			2	
ZYQ	CHINA, CHINEESE	M				2	
SL	UKRAINE,	F	1			1	
AF	IRAN, FARSI	F	AB	AB	AB	AB	AB
NIR	CONGO	F	2	1			
BC	ALGERIA, ARABIC/FRENCH	F	4	5		1	
24	**TOTAL RESPONSES**		48	24	4	25	

APPENDIX B

QUESTIONNAIRE

LEARNING WITH TECHNOLOGY: The impact on teaching and learning using digital technology (SMARTBOARD) in English Language classrooms

Questionnaire for Language Teachers use of the SMARTBOARD

A. Teacher information:

1. Name of school you are presently teaching at _____.
2. Gender: Male _____ Female _____.
3. How many years of experience do you have teaching an English Language course?_____.
4. Do you have any other teaching experiences? Yes___ No___. If yes, please list course or disciplines taught _____.
5. What level(s) of English Language course are you currently teaching? _____.
6. Have you taught other levels? Yes___ No___. If yes, please list _____.
7. Have you used computer technology (e.g. video tape, internet, hyperlinks) in the preparation &/or delivery of our courses? Yes __ No ___. If yes, please elaborate _____.

B. Use of technology and pedagogical approach:

On a scale of 1 - 5 (see scale below) how would you answer the following:

1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree

8. I have always been comfortable with technology _____.
9. I have no interest in using the latest technology in the delivery of my courses material _____.
10. I always try to use the latest technology in delivery of my course material _____.
11. I am very interested in the latest pedagogical innovations (e.g., leaning scenarios, constructing knowledge) _____.
12. I am not interested in the latest technology for teaching and learning _____.
13. I have taken professional development courses to improve my teaching _____.
14. I regularly read and/or keep up-to-date with publications or other news sources that discuss new teaching methods ____.
15. I regularly read and/or keep up-to-date with publications or other news sources that discuss the uses of technology ____.
16. I believe the use of technology is important to encourage students' participation _____.
17. I do not believe that in order to learn, my students need to be active participants in my class _____.
18. I believe that technology could be a deterrent to some students in the classroom _____.
19. Whenever available, I use the SMARTBOARD technology in my teaching? _____.

C. Course preparation and classroom practice without the use of the SMARTBOARD: (Circle the answer you agree with).

20. a. When teaching a course for the first time, how long does it take you to prepare a lesson plan for a 4-hour class?
    a. less than 1 hour b. 2-4 hour c. 5-8 hours d. 9-12 hours e. more than 12hours

    b. Does the amount of time change for subsequent course preparations? Yes ___ No ___ (Elaborate if necessary)
    _____

21. a. During your class, do you encourage students to use the blackboard or any other technology? Yes ___ No ____. (Elaborate if necessary) _____

b. Do you give students homework that use technology (e.g., searches on the internet; use of web links related to news, podcast, grammar and vocabulary)?

c. Which students are more comfortable using the blackboard? Male ____. Female ____. No difference _____.

This section is <u>ONLY</u> for those who <u>USE</u> the SMARTBOARD in their teaching. (Circle the answer you agree with).

D. Course preparation with the use of the SMARTBOARD:

22. a. When using the SMARTBOARD, how long does it generally take to prepare a lesson plan for a 4-hour class?

a. less than 1 hour b. 2-4 hour c. 5-8 hours d. 9-12 hours e. more than 12 hours

b. Does the amount of time change for subsequent course preparations? Yes ___ No _____ (Elaborate if necessary).

_____

_____

23. For a 4-hour class, what percentage of the class time would you use the SMARTBOARD?

a. less than 25% b. 25-50% c. 50 – 75 % d. more than 75%

24. In a typical week, how frequently do you use the SMARTBOARD?

a. not at all b. rarely c. some days d. most days e. every day

25. What other technologies do you use? (Elaborate if necessary).

_____

_____

For questions 26-29 how would you answer the following, using the scale 1 - 5 (see scale below):

1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree

26. I generally use the SMARTBOARD technology whenever it is available _____.
27. I enjoy finding innovative ways to present my course material with the SMARTBOARD _____.
28. Setting up the SMARTBOARD every day is time consuming _____.
29. There is no technical support available to help with problems that arise with the SMARTBOARD _____.

E. Learning how to use the SMARTBOARD. (Circle the answer you agree with).

30. Your initial impression about the SMARTBOARD as a learning and teaching tool?

a. very positive b. positive c. neutral d. very negative e. negative

31. How long did it take you to feel comfortable using the SMARTBOARD? (Circle the answer you agree with).

a. less than 5 hours b. 5-10 hours c. more than 10 hours d. still not comfortable

32. Did you encounter any problems learning how to use it? Yes___ No___. If Yes, Please elaborate:

33. Using the scale below describe your experience with the following features of the SMARTBOARD:

1: very difficult	2: Difficult	3: Neutral	4: Easy	5: very easy

a. Learning the Notebook software _____.
b. Establishing reliability of the Internet connection _____.
c. Toggling between the keyboard and the screen_____.
d. Saving and retrieving your work into a notebook file _____.
e. Changing the colors and sizes of the writing tools (i.e., pens) _____.
f. Using Video Player, Recorder, and Notebook _____.
g. Using Power Point with the Navigation Tool _____.
h. Controlling the screen by touching _____.

34. Have some or any of the above influenced your use of the SMARTBOARD? Yes ___. No ___. (Elaborate if necessary)

F. Value of the SMARTBOARD as a pedagogical tool. (Circle the answer you agree with).

35. How valuable a resource is the SMARTBOARD for a typical lesson?

1: no value 2: of little value 3: somewhat valuable 4: valuable 5: very valuable

36. How effective is the SMARTBOARD for students' learning?

1: very ineffective 2: not effective 3: somewhat effective 4: effective 5: very effective

37. How effective is the SMARTBOARD for motivating students?

1: very ineffective 2: not effective 3: somewhat effective 4: effective 5: very effective

38. a. Do you encourage your students to use the SMARTBOARD? Yes ___ No ____.
b. Which students are more comfortable using the SMARTBOARD? Male ____. Female ___. No difference ____.

39. What tasks do you believe the SMARTBOARD is useful for? (e.g., teaching, engagement of students, course management). Please explain or give other comments.

If you are willing to be contacted for follow-up, please enter your contact information below.

Name (optional) _____

Email (optional) _____

Thank you!

APPENDIX C

RESEARCH COMMITTEE CONSENT LETTER

Commission scolaire English-Montréal
English Montreal School Board

April 15, 2010

Ms. Farida Alli
45 Apple Hill
Baie d'urfe, QC
H9X 3H3

Dear Ms. Alli:

The Research Committee met on November 12, 2009 to consider your proposed research project entitled *"What is the impact on teaching and learning using digital technology (Smartboard) in the classroom? Is it an effective learning tool?"*

It is my pleasure to inform you that your recent modifications to your original proposal have been approved.

Upon completion of this study the School Board would appreciate a brief resume of your findings, as well as a copy of your report once it has been finalized.

Yours truly,

Horace I Goddard
Chairman
Research Committee

HIG:cds

Commission scolaire English-Montréal

English Montreal School Board

November 18, 2009

Ms. Farida Alli
45 Apple Hill
Baie d'urfe, QC
H9X 3H3

Dear Ms. Alli:

The Research Committee met on November 12, 2009 to consider your proposed research project entitled *"What is the impact on teaching and learning using digital technology (Smartboard) in the classroom? Is it an effective learning tool?"*

It is my pleasure to inform you that your proposal has been approved.

The principal of James Lyng Adult Centre will be informed that this research project has been approved.

Upon completion of this study the School Board would appreciate a brief resume of your findings, as well as a copy of your report once it has been finalized.

We wish you well with this research and future endeavors.

Yours truly,

Horace I Goddard
Chairman
Research Committee

HIG:cds

APPENDIX D

TEACHER CONSENT FORM

Faculty Consent Form
Researcher: Farida Alli (James Lyng Adult Centre - EMSB)

What is the impact on teaching and learning using digital technology (SMARTBOARD) in the classroom? Is it an effective learning tool?

September 11, 2009

Dear Teachers:

You are being asked to participate in a research study conducted by the above named researcher for the purpose of understanding how digital technology, in this case the SMARTBOARD, is being used to promote student learning. Specifically, how its use affects, or is affected by the pedagogy and practices of the classroom.

I would like your permission to come into your classroom and to collect observational data. These observations will in no way interrupt your class or take away from your classroom time. The data I wish to collect from your class includes: (1) observation or video taped data collected from each class, which may include, (2) relevant lesson plans or classroom activities, and (3) results of tests and the final exam you give to your students. If you agree to participate, you will be agreeing to give me permission to collect all of the above.

All information collected for the purpose of this research will be kept strictly confidential. **NO NAMES OR ANY OTHER IDENTIFICATION WILL BE USED IN ANY PUBLICATION(S) THAT MAY RESULT OUT OF THIS STUDY.** All data collected will be used for this study only and destroyed within 5 years of the completion of the study.

YOUR COOPERATION IS VOLUNTARY. **You have the right to decline participation in this research study.** Also, you have the right to discontinue your cooperation at any time. Your non-participation or withdrawal will in no way affect your standing in your school.

Any questions you have with respect to this research should be addressed to the principal researcher: Farida Alli; farialli_19@yahoo.ca, (514) 457-3914.

Name of Teacher (A) (please print): _____

Signature: _____ Date: ____ /____ /_____

Day/month/year

APPENDIX E

STUDENT CONSENT FORM

Student Consent Form

Researcher: Farida Alli (James Lyng Adult Centre - EMSB)

September 11, 2009

Dear Student:

You are being asked to participate in a research study conducted by the above named researcher for the purpose of understanding how digital technology, in this case the SMARTBOARD, is being used to promote student learning. Specifically, how its use affects, or is affected by the pedagogy and practices of the classroom.

I would like your permission to come into your classroom and to collect observational data. These observations will in no way interrupt your class or take away from your classroom time. The data I wish to collect from your class includes: (1) observation or video taped data collected from several classes, which may include, (2) results of tests and the final exam. If you agree to participate, you will be agreeing to give me permission to collect all of the above.

All information collected for the purpose of this research will be kept strictly confidential. **NO NAMES OR ANY OTHER IDENTIFICATION WILL BE USED IN ANY PUBLICATION(S) THAT MAY RESULT OUT OF THIS STUDY.** All data collected will be used for this study only and destroyed when the study is completed.

YOUR COOPERATION IS VOLUNTARY. **You have the right to decline participation in this study (N.B. that declining participation in the study does not exclude you from doing the individual and group work, which is a normal part of your course).** Also, you have the right to discontinue your cooperation at any time. Your non-participation or withdrawal will in no way affect your standing in this course, and at James Adult Centre or elsewhere.

Any questions you have with respect to this research should be addressed to the principal researcher: Farida Alli: farialli_19@yahoo.ca. Any concerns related to perceived misconduct of the researcher should be directed to the principal of the school – Ms. Habza Shedlack: 514-846-0019, ext. 2332

Please place a check mark beside the statement (item 1 or 2) that describes your decision regarding participation:
(Please choose <u>one</u> only):

1. I <u>agree</u> to give permission to both requests. We will collect your grades and the relevant assignments from your teacher. We will not require anything additional from you.

2. I do <u>NOT</u> give permission to any of the requests. We will NOT collect your grades and the relevant assignments from your teacher. And, we will REMOVE observations that include you from our data.

Name (please print) _____

Student ID _____

Student's signature _____ Date _____

Parent's signature if you are a minor (i.e., 17yrs and under) _____

APPENDIX F

PROTECTION OF HUMAN SUBJECTS

Researcher: **Farida Alli (B.Ed., D.E.), Masters in Education Candidate at the University of Sherbrooke**

Title: **Learning with Technology: The impact on teaching and learning using digital technology (SMARTBOARD) in the classrooms**

Dear Colleague:

You are being asked to participate in a research study conducted by the above named researcher for the purpose of her Master's thesis, which investigates how digital technology, in this case the SMARTBOARD, is being used to promote student learning. The attached questionnaire is to obtain information on specifically, how the use of the SMARTBOARD affects, or is affected by the pedagogy and technology practices of the classroom.

All information collected for the purpose of this research will be kept strictly confidential. **No names or any other identification will be used in her Master's thesis or any reporting of this study.** All data will be assigned a code number and pseudonyms will be used if necessary. Only the researcher and her supervisor will have permission to analyze the anonymous data. All data collected will be used for this study only and destroyed within 5 years of the completion of her thesis.

Thank you for your cooperation, and especially for your time in answering this questionnaire.

By signing this form you freely give consent to Farida Alli to use the information you provide on the attached questionnaire for the purposes and conditions stated above.

Name of Teacher (please print)_____

Signature _____

Date: _____/_____/_____

Day Month Year

Please remove this section below and keep for reference

In appreciation of your participation, your name will be entered in a draw for a prize of $25.00.

If you have any questions regarding the research, please address them to the researcher, Farida Alli < farialli_19@yahoo.ca > or her Master thesis supervisor, Dr. Elizabeth Charles < echarles@dawsoncollege.qc.ca >

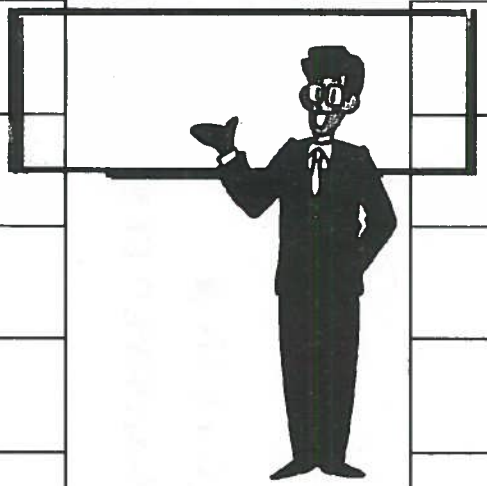
APPENDIX G

SEATING PLAN &
CODING QUESTION-ANSWER FEEDBACK

APPENDIX G

TEMPLATE OF A SEATING PLAN

S=SOLICITED, U=UNSOLICITED, F=FREE TALK, # = STUDENT ASK QUESTION, NS=NO RESPONSE TO SOLICITED QUESTION



APPENDIX G

Coding Question-Answer Feedback

Student Sex		
Symbol	**Label**	**Definition**
M	Male	The student answering the question is male.
F	Female	The student answering the question is female.
Student Response		
S	Solicited	Teacher asks individual student a question and student answers.
U	Unsolicited	Another student calls out the answer and the teacher acknowledges that it is correct.
F	Free Talk	Student speaks to another student while lesson is being taught.
//	Student Ask Question	Student asks a question or makes a comment without teacher solicitation