SMART Technologies Research Project

at

Dr. Gordon Townsend School
2005-2006

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Executive Summary

Through the support of Innovative Learning Services (ILS), Information Technology Services (ITS) and a research grant from SMART Technologies, an investigation of how interactive whiteboards could potentially impact teaching and learning in unique learning environments is the context of this research initiative. Dr. Gordon Townsend School at the Alberta Children's Hospital was selected to represent a exceptional population that is representative of the diverse and unique learning situations within Calgary Board of Education (CBE) schools with the intent of investigating the extent to which SMART Board™ interactive whiteboards and supporting software may impact the learning experiences of both teachers and students in such learning environments. Additionally, this research initiative is also intended to inform the CBE of the professional development requirements for teachers utilizing SMART Board interactive whiteboard technologies in the classroom environment.

More specifically, the goals of this research project are to (i) determine the impact of using SMART's technology hardware and software with a variety of unique learning, behavioural and emotional needs in an exclusive learning environment, (ii) determine changes in student engagement as a result of engaging with SMART's product, (iii) determine teachers' perceptions of changes in students' attitudes towards learning resulting from the use of SMART's hardware and software products, (iv) determine the impact on teacher practice of using SMART hardware and software with students, (v) determine teachers' perceptions of professional development needs regarding use of SMART hardware and software.

This final report is intended to provide research results to participants and stakeholders regarding the use of SMART's hardware and software with students who have been brought into an exclusive environment due to a range of learning, physical or emotional needs; over time. The results of this report reveal data regarding the positive impact that the SMART Board interactive whiteboard has had on student engagement, student gross motor and cognitive experiences, as well as the impact SMART technologies have had on the teaching practice of participating teachers. Past research from SMART reveals that the implementation of interactive whiteboards positively affects learning in several ways. Not only can they "raise the level of student engagement in a classroom, motivate students and promote enthusiasm for learning," (SMART Technologies, 2004) they can also positively impact student attendance, attend to many different learning styles, and have also been successfully employed in hearing and visually impaired learning environments. (SMART Technologies, 2004) The key findings in this report also support the conclusions of this current research.

There is no doubt that interactive whiteboards are engaging and provide powerful learning opportunities for all learners. The findings in this particular project highlight some unique issues regarding accessibility and physical access to SMART Board hardware that were possibly not considered in the past . Additionally, current research suggests that interactive whiteboard technology has tremendous potential for classroom implementation; however, the data in this study also reveals that a lack of teacher comfort with technology and continuous job embedded professional development opportunities created significant barriers in its successful implementation.

Introduction

<u>Background</u>

The 21st century classroom is a dynamic and diverse learning community. Teachers are faced with an ever increasing need to bring differentiated learning opportunities into classroom practice. New technologies have the potential to enable numerous students with a variety of learning and emotional disabilities to become better and more efficient learners, allowing them to express themselves in ways they could not before. (Rose and Meyer, 2002) New models for instruction include designing curriculum to make learning accessible and appropriate for individuals with different learning styles, abilities, and disabilities in widely varied learning contexts. Digital learning tools can be powerful tools to "augment and streamline a teacher's ability to provide students with timely, personalized balanced and varied attention" (Rose and Meyer, 2002). Notably, interactive and flexible technologies like the interactive whiteboard have been significantly investigated in a variety of learning contexts and environments. This particular study seeks to further understand the impact and professional development requirements for successfully implementing the use of interactive whiteboards in a specialized learning environment at the Alberta Children's Hospital.

<u>About Dr. Gordon Townsend School</u>

Dr. Gordon Townsend School of the Calgary Board of Education offers a unique learning environment for a wide range of learning needs. Established under the Calgary Board of Education in 1962, Dr. Gordon Townsend School is housed within the Alberta Children's Hospital. Dr. Gordon Townsend School was formerly known as the Children's Hospital School until 1977, when it was officially named after Dr. Gordon Townsend, a pediatric surgeon with a love for children and a belief in the importance of patients receiving an educational component along with their daily medical requirements.

Dr. Gordon Townsend School offers multi-disciplinary programs and services to elementary and secondary students with a variety of mental health needs, physical/rehabilitation requirements and eating disorders. All students are referred to the various programs by their physician. Integration into community schools, as soon as possible, is the ultimate goal for all students in the program.

Programs and services are provided by a multi-disciplinary team that may include education, nursing, physiotherapy, occupational therapy, recreational therapy, speech/language therapy, psychology, social work, psychiatry, and family therapy. As a result of the unpredictable needs of each particular student, the population of the school changes dramatically during the course of a year. Each school year there are over 150 students who receive programs and services; however, there are only about 40 students in the school at any given time. This ever-changing environment includes transient, returning and, in some cases, permanent clientele. The variety of necessary health and therapeutic interventions poses significant challenges for students, staff and family members involved in the program. Because the ability to provide meaningful connections to curriculum in the complex day of these children is highly dependent on operational issues and scheduling of the hospital and its staff, one significant role of Dr. Gordon Townsend school is to meet the challenge of bringing real value and support for learning that is linked to the children's well being and ability to function successfully beyond their hospital experiences. Bridging the important connection between successful learning experiences to positive physical and mental health is critical in this environment.

The purpose of this research study is to examine the impact of the infusion of a variety of technologies on the ability to engage and meet the diverse learning needs of this unique population of students. The use of the SMART Board interactive whiteboard and the unique collaborative tools that the technology has to offer presents a particularly exceptional opportunity to the staff and students at Dr. Gordon Townsend school as they

work together to shift the ways in which teachers and students interact in the learning process.

It is anticipated that the SMART Board interactive whiteboard will impact the learning process in the following contexts:

- As a strategy to support Individualized Program Plans (IPPs) for learners
- To develop positive self-esteem and self-awareness in all students
- Assist learners to successfully transition to the individualized academic program offered at Dr. Gordon Townsend School
- To facilitate successful transitions to subsequent educational settings
- To offer alternative access to digitized learning resources to support individual needs of learners
- To positively impact teacher practice
- To enhance student achievement though multiple literacies

Many of SMART's tools offer unique learning opportunities that may ultimately help to ensure a successful transition to and from each student's individual educational setting. Technology provides alternative strategies to reduce barriers to success for students with many unique needs, but identifying which technologies are beneficial for students with complex needs can be challenging. The use of the SMART Board technology is one potential strategy for students experiencing such barriers to their learning.

ILS is particularly interested in the impact that technology will have on students in this particular learning environment. Further research is required to identify the success factors for utilizing such technology in highly-transient populations such as those in Dr. Gordon Townsend School. This research also aims to identify the impact on student learning and teacher practice.

Recent findings from a review of Alberta Initiative for School Improvement 2000-2003 technology projects have informed the design of this research initiative. The review of AISI technology projects identified the following findings that relate to the planned implementation of this initiative:

- The use of lead teachers who have technological skills improved the implementation of technology within classrooms.

- Teachers responded positively to initiatives that taught them new skills that could be applied immediately.

- The presence of physical technology resources encouraged exploration with the technologies.

- Projects that integrated technology into regular curricula were more successful than those that tried stand-alone technological training.

(Stakeholder Technology Branch, 2004)

Purpose

This study seeks to examine the use of SMART's hardware and software for evidence of benefits for students with a variety of learning needs who have been brought into an exclusive environment due to a variety of learning, physical or emotional needs for a variety of durations of time. In addition, it seeks to investigate impact on student learning experiences and on the practice of teachers, who are engaged in designing learning experiences using SMART's hardware and software.

Goals and Objectives

- To determine the impact of using SMART's hardware and software with a variety of unique learning, behavioural and emotional needs in an exclusive learning environment.

- To determine changes in student engagement.

- To determine teachers' perceptions of changes in students' attitudes towards learning resulting from the use of SMART's (hardware and software).

- To determine the impact on teacher practice of using SMART Technology hardware and software with students.

- To determine teachers' perceptions of professional development needs regarding use of SMART's hardware and software.

Critical Success Factors

- Students will have reliable access to SMART's hardware and software.

- Teachers will have access to timely and appropriate professional development and hardware/software training.

- Teachers will be interested and engaged in this pilot.

- Administration will support a plan for selecting teachers and students.

- The school will support gathering, compiling and submitting data for analysis based on the research protocol.

- Teachers and administrators will be in support of collecting and sharing data emerging from student assessments.

- Teachers will be provided with the necessary PD and hardware/software training to successfully implement this pilot.

- Internal technical support will be available in order to support this project.

- Project teachers will be interested in participating in professional development opportunities.

Research Methodology

With the intent of exploring the research topic thoroughly, a mixed methodology has been selected. The use of multiple data collection methods can contribute to "the trustworthiness of the data" (Glesne, 1999, p. 31). Therefore, the following selection of

research techniques will be employed: a) student satisfaction survey; b) parent survey; c) teacher online pre- and post-surveys; d) teacher interviews; and e) teacher journal entries.

<u>Participants</u>

- Teachers: Two teachers, selection based on teacher interest and administrative support
- Students: Students enrolled during the 2005-06 school year.
- Parents: Parents of students enrolled during the 2005-06 school year.

Teachers – Teachers will have been involved in professional development training provided by Innovative Learning Services in regard to SMART Board interactive whiteboards and applicable software, during the 2005-06 school year. They will also have ongoing access to additional professional development needs.

Students – Students will be a variety of students selected by the schools, but will vary in compilation given the transient nature of the school. As a result, the teacher feedback via journals and assessments via surveys will be most important in this study. Each participating student for whom direct information will be gathered will be required to have parent consent forms completed in accordance with FOIP and ethics review.

Parents – The parents of the students at Dr. Gordon Townsend are often heavily involved in the students' learning and will therefore be asked to provide their perspective on the usefulness of using the SMART Board interactive whiteboard within their son/daughter's classroom.

<u>Data Gathering</u>

- Informal data will be gathered through students during the each of their stays at Dr. Gordon Townsend School through informal anecdotal data. This data will be gathered by participating teachers in order to obtain a global picture of the impact

of the technology on a range of students with a range of needs throughout the school year.

- The teacher journals will provide a perspective of the issues and promising practices arising from day-to-day use of the SMART technologies and will be included in the research data for analysis.

- Teachers will be invited to participate in an online pre- and post-survey to assess teacher perception of changes to students' conceptions of themselves as learners, the impact technology has had on the transition for students to Dr. Gordon Townsend School during the program and back to subsequent programs, and professional development needs and effectiveness of PD provided.

- Students will be asked to complete a paper survey distributed by their teachers. Due to a variety of difficulties students may have with properly completing a survey, students will receive support from either their teacher or a parent.

- Parents will be asked to complete a paper survey based on their perceptions of the impact the SMART Board interactive whiteboard has had on their son/daughter.

Data will be collected and organized to address research outcomes, objectives and critical success factors

Results

Student Survey Results

The student surveys consisted of four questions, including two open-ended responses and two scaled-choice response questions (See Appendix A). Due to the age of the participating students and a variety of physical and mental difficulties of the student population, all scaled response questions included icons representing the Likert scale options. A total of 11 surveys were completed by the students with assistance from their parents or teacher. The results of the survey are discussed below.

The first question on the survey asked the students to state whether they enjoyed or did not enjoy specific attributes of using the SMART Board interactive whiteboard within the classroom. Results are shown in Table 1 below.

Table 1: Student Enjoyment of SMART Board interactive whiteboard Features and Usage

	Really enjoyed	Enjoyed	Didn't enjoy
My ability to get involved with the SMART Board interactive whiteboard	11 (100%)	0 (0%)	0 (0%)
The large screen	11 (100%)	0 (0%)	0 (0%)
How my teacher used it with me	11 (100%)	0 (0%)	0 (0%)

These results indicate that all of the student who filled out the survey 'really enjoyed' all three aspects of the SMART Board interactive whiteboard included in the survey question. The students' ability to get involved with the SMART Board interactive whiteboard, the large screen, and how the teacher used the SMART Board interactive whiteboard with the students were all viewed as overwhelmingly positive aspects of using the SMART Board interactive whiteboard within the classroom.

Related to the first question, students were also given an open-ended question, which asked them to describe their favourite thing about having the SMART Board interactive whiteboard in the classroom. Responses mostly included statements about the games and the ability to move objects on the screen with their finger. Some of the responses included:

- "It was fun. I liked the pictures. I liked my 'magic' finger"
- "It was like using a computer, but more fun. I could show other kids stuff."
- "I got to do my math and language arts on it. I got to do activity time on it."

The third question on the survey was also open-ended and asked the students to describe anything they did *not* like about the SMART Board interactive whiteboard. Most of the students stated that there was nothing they did not like. Four students provided responses, which included the following:

- "When I stand in the light, I have to move sideways."

- "Waiting turns sometimes took a long time."
- "Some things are hard to reach."
- "I had to take turns. I couldn't use it by myself."

The final question asked students whether they agreed or disagreed with a number of statements relating to the use of the SMART Board interactive whiteboard. The responses are shown in Table 2 below.

Table 2: Student Opinions about Using the SMART Board interactive whiteboard

	Agree	Disagree	Don't know
The use of the SMART Board interactive whiteboard helped me learn	**9 (82%)**	0 (0%)	2 (18%)
I liked the SMART Board interactive whiteboard because it is the way I like to learn	**8 (73%)**	0 (0%)	3 (27%)
I liked being able to use the SMART Board interactive whiteboard	**11 (100%)**	0 (0%)	0 (0%)
Having the SMART Board interactive whiteboard in my class helped me to 'catch-up' on my work	2 (18%)	2 (18%)	**7 (64%)**
The SMART Board interactive whiteboard gave me a chance to teach my classmates	**6 (55%)**	3 (27%)	2 (18%)

These results show that the majority of the students agreed that the SMART Board interactive whiteboard helped them to learn (82%), it was the way they liked to learn (73%), they liked being able to use the SMART Board interactive whiteboard (100%), and it gave them a chance to teach their classmates (55%). The majority of the students chose the response 'Don't Know' to the statement that having the SMART Board interactive whiteboard in class helped them to 'catch-up' on their work while two students agreed and two disagreed. Since the students and Dr. Gordon Townsend are constantly missing classes and assignments, it was surprising to see that most students stated that they did not know if the SMART Board interactive whiteboard played a role in their ability to catch-up on any missed work. While the students agreed that the SMART Board interactive whiteboard was an effective tool for learning, it may not have been utilized as a tool for catching-up on missed work.

In addition to the student surveys, parents were also asked to participate in a survey to determine the impact they felt the SMART Board interactive whiteboard had on their children. The survey consisted of 3 questions, including two scaled-choice questions as well as an open-ended response. Unfortunately due to difficulties distributing and retrieving the surveys from this transient parent population, only three completed surveys were returned. Due to this low response rate, it should be noted that the results from the parent survey are not necessarily representative of the entire parent population. Results will still be discussed in order to discover any trends that existed among the three parents.

The first question asked the parents to indicate the extent to which they thought their child enjoyed or did not enjoy various aspects of the SMART Board interactive whiteboard. The results are shown in Table 3 below.

Table 3: Parent Opinions about Using the SMART Board interactive whiteboard

	Agree	Disagree	Don't know
The use of the SMART Board interactive whiteboard helped my son/daughter to get involved in the learning process	**3 (100%)**	0 (0%)	0 (0%)
My son/daughter enjoyed learning with the large screen on the SMART Board interactive whiteboard	**3 (100%)**	0 (0%)	0 (0%)
My son/daughter benefited from their teacher(s) utilizing the SMART Board interactive whiteboard in their teaching practice	**2 (66%)**	0 (0%)	1 (33%)

These results show that all three parents agreed that the use of the SMART Board interactive whiteboard helped their son/daughter to get involved with the learning process and that their son/daughter enjoyed learning with the large screen. Two of the parents (66%) agreed that their son/daughter benefited from their teachers using the SMART Board interactive whiteboard while one parent (33%) indicated that they did not know.

The second question on the survey asked the parents whether they agreed or disagreed with a number of statements relating to their child's experience using the SMART Board interactive whiteboard. The results are shown in Table 4 below.

Table 4: Parent Opinions about Child's Experience Using the SMART Board interactive whiteboard

	Agree	Disagree	Don't know
The use of the SMART Board interactive whiteboard helped my son/daughter learn	**2 (66%)**	0 (0%)	1 (33%)
The use of the SMART Board interactive whiteboard was more in tune with my child's learning style	**2 (66%)**	0 (0%)	1 (33%)
The use of the SMART Board interactive whiteboard was more in tune with my child's physical needs	**2 (66%)**	0 (0%)	1 (33%)
My son/daughter liked the interactivity of the SMART Board interactive whiteboard	**3 (100%)**	0 (0%)	0 (0%)

These results show that all three parents felt their son/daughter liked the interactivity of the SMART Board interactive whiteboard. Additionally, two of the three parents (66%) agreed that the SMART Board interactive whiteboard helped their son/daughter learn, was more in tune with their learning style, and was more in tune with their physical needs. The remaining parent stated that he or she did not know.

The final question was open-ended and asked the parents to add any additional comments concerning the use of the SMART Board interactive whiteboard. Two of the parents left comments, which included the following (words in brackets have been edited to ensure confidentiality):

- "A great new tool! Thank you!"
- "I think it is a great tool. I believe it would have great potential in a class like my (son/daughter's). Unfortunately, I did not observe my (son/daughter) using it, so I'm not sure how it affected (his/her) learning."

While the results from the parent survey may not be representative of the entire parent population, they suggest that the participating parents were very pleased that their son/daughter had the opportunity to use the SMART Board interactive whiteboard

within their classroom. Using the SMART Board interactive whiteboard was viewed as being a very positive experience and based on these results it can be suggested that these parents saw the SMART Board interactive whiteboard as having great potential to improve the learning environment for similar students in the future.

Teacher Pre-Survey Results

Along with the student and parent surveys, teachers were asked to participate in two surveys in order to better understand their experiences using the SMART Board interactive whiteboard and their perceptions of the impact it had on their students. Teachers were asked to complete both a pre- and post-survey in order to monitor any changes in attitude that may have occurred over the course of the year. The pre-survey consisted of nine questions including four scaled-choice questions and five open-ended responses. The post-survey was presented in the same format.

In addition to the 2 teachers involved in the project, the school principal was also asked to complete the surveys since he was closely involved with the implementation of the SMART Board interactive whiteboard in the classroom. Results from the pre-survey will be discussed first followed by a description of the results from the post-survey.

The first question teachers were asked in the pre-survey was whether they had ever used a SMART Board interactive whiteboard in the past. All three participants stated that they had never used a SMART Board interactive whiteboard previous to this study. When asked if they had ever been at a school where a SMART Board interactive whiteboard was available, two teachers stated that they had while one had not. The two teachers who had previously been at a school with a SMART Board interactive whiteboard were asked to describe how it had been used. The responses included:

- "It was being shared by all of the teachers throughout the school and each individual was using it differently."
- "I saw the SMART Board being used… as a way to enhance instruction."

Teachers were then asked to indicate whether they agreed or disagreed with a number of statements relating to their current perceptions of the SMART Board interactive whiteboards. The results are shown in Table 5 below.

Table 5: Initial Teacher Perceptions of the SMART Board interactive whiteboard

	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
SMART Board interactive whiteboards are able to support a variety of instructional approaches to teaching concepts	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)
SMART Board interactive whiteboards are best used for whole group instruction.	0 (0%)	1 (33%)	0 (0%)	0 (0%)	**2 (66%)**
I see huge potential for using these interactive whiteboards with students and their learning	**2 (66%)**	1 (33%)	0 (0%)	0 (0%)	0 (0%)
There are relevant curriculum resources that can be leveraged through the use of SMART Board interactive whiteboards	0 (0%)	**2 (66%)**	0 (0%)	0 (0%)	1 (33%)
I predict that SMART Board interactive whiteboards will suit mostly students who are highly tactile and visual	0 (0%)	1 (33%)	0 (0%)	0 (0%)	**2 (66%)**
I predict that learning about SMART Board interactive whiteboards will take up too much of my professional time	0 (0%)	0 (0%)	**2 (66%)**	0 (0%)	1 (33%)
SMART Board interactive whiteboards require a lot of maintenance to operate in the classroom	0 (0%)	0 (0%)	**2 (66%)**	0 (0%)	1 (33%)
Teacher background knowledge of SMART Board interactive whiteboards is an essential requirement before using these tools as an instructional tool	**2 (66%)**	1 (33%)	0 (0%)	0 (0%)	0 (0%)
Student background knowledge of SMART Board interactive whiteboards is an essential requirement before allowing them to use these tools to express their understanding	0 (0%)	**2 (66%)**	0 (0%)	0 (0%)	1 (33%)

These results show that all 3 teachers initially agreed or strongly agreed that the SMART Board interactive whiteboards would be able to support a variety of instructional approaches to teaching concepts, that there was huge potential for using the SMART Board interactive whiteboards with students and their learning, and that teacher background and knowledge is an essential requirement before using the SMART Board interactive whiteboards as an instructional tool. All three teachers also disagreed or were 'unsure' that learning about SMART Board interactive whiteboards would take up too much of their professional time and that they would require a lot of maintenance to operate in the classroom. Two teachers were unsure if the SMART Board interactive whiteboards are best used for whole class teaching of if the SMART Board interactive whiteboards would suit mostly students who are highly tactile and visual, while one teacher agreed with both statements. Conversely, two teachers agreed that there are relevant curriculum resources that can be leveraged through the use of SMART Board interactive whiteboards and that student background knowledge of SMART Board interactive whiteboards would be essential before allowing them to use these tools to express their understanding, while one teacher was unsure.

Teachers were also asked to indicate whether they agreed or disagreed with a number of statements relating to professional development. The results are shown in Table 6 below.

Table 6: Initial Teacher Opinions Regarding Professional Development

	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
I currently don't use technology that much in my classroom	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)
My current comfort with technology will significantly determine my chances of using SMART Board interactive whiteboard effectively	0 (0%)	**2 (66%)**	0 (0%)	0 (0%)	1 (33%)
I learn best by watching and observing first then trying out	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)

something new					
I learn best by tinkering or playing with the software	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)
I am extremely uncomfortable when people watch me using technology	0 (0%)	**1 (33%)**	**1 (33%)**	**1 (33%)**	0 (0%)
I think it is important to show parents and students how I learn	0 (0%)	**2 (66%)**	0 (0%)	0 (0%)	1 (33%)

Responses to this question show that all three teachers agreed that they do not use technology very often in the classroom, they learn best by watching and observing first, then trying out and by tinkering or playing with the software. Two of the teachers also agreed that their current comfort with technology would significantly determine their chances of using the SMART Board interactive whiteboard effectively and that it is important to show parents and students how they learned. The remaining teacher was unsure about both statements. Finally, one teacher agreed, one disagreed, and one strongly disagreed that they were extremely uncomfortable when people watched them use technology.

The remaining questions in the survey were all open-ended responses. The first question asked teachers to describe the value they thought the introduction of the SMART Board interactive whiteboards would have for their professional experience as a teacher. The responses were as follows:

- "It is always exciting to use a new medium for teaching students special needs. I believe the SMART Board will be a valuable tool to enrich my professional experience and by broadening my ability to use technology to adapt to our students' needs."
- "As a teacher I am always trying to utilize the most recent and engaging resources as possible to enhance the learning experiences of my students. Therefore, I feel that in using the SMART Board within my classroom I will be learning how to use a teaching tool which is able to accommodate the many different learning styles of the students who will enter my classroom."
- "Hopefully, the use of SMART Boards will provide another way to enhance key concepts for our students, who are generally kinaesthetic and visual learners."

Teachers were also asked how they would like to see the SMART Board used in their classroom. Teachers responded with the following comments:

- "For all subjects...limited only by one's imagination. (i.e., individual student learning, large and small group work, flexible grouping, teaching and presenting for students and teachers, assemblies, etc.)"
- "I would like to incorporate the use of the SMART Board into all of the different subject areas taught within my classroom. I would also like to have the students within my classroom have as much hands-on use of the SMART Board as possible."
- "As a tool to enhance instruction for our students --- whole class and small group."

In addition to potential uses, teachers were also asked to comment on the constraints or obstacles that existed and needed to be overcome before they could effectively use the SMART Boards within the school. Responses included:

- "For my special population of students, the front projector is an issue as most students will have difficulty moving to the side in order to see their work on the SMART Board. The cords/plugs which attach to the SMART Board and computer are also physical obstacles as my students are typically in wheelchairs or using walkers."
- "Finding quality programs to use with the SMART Board. - Lack of space to store and use the SMART Board. - I am somewhat concerned about using the front projector with the SMART Board because of the shadow it creates on the SMART Board screen. I feel a rear projector system would be much more user friendly."
- "Short term student placements, transiency, and limited blocks of instructional time in this special setting would be limiting factors. Teacher knowledge, finding time to use the SMART Boards appropriately, and comfort are potentially constraining."

Finally, teachers were asked to provide any final comments relating to the use of SMART Board interactive whiteboards in their classroom. Only one teacher provided a comment, which stated:

- "It would be nice to have a small manual that offers suggestions/examples of lessons....what to do with the SMART Board interactive whiteboard in the various subjects and at different grade levels. (i.e., How to use the SMART Board to teach Number Concepts to grade 2's)"

Teacher Post-Survey Results

In addition to the pre-survey, teachers were asked to complete a post-survey, which included similar questions in order to determine any changes in attitude towards the

SMART Board interactive whiteboard. Comparisons to the pre-survey will be made in the

conclusion section of this paper. The post-survey was distributed to the same three

participants and included the same number of questions.

The first question asked teacher to indicate whether they agreed or disagreed with a

number of statements relating to the use of the SMART Board interactive whiteboard.

The results are shown in Table 7 below.

Table 7: Teacher Perceptions of the SMART Board interactive whiteboard

	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
SMART Board interactive whiteboards are able to support a variety of instructional approaches to teaching concepts	**2 (66%)**	1 (33%)	0 (0%)	0 (0%)	0 (0%)
SMART Board interactive whiteboards are best used for whole group instruction	0 (0%)	0 (0%)	1 (33%)	0 (0%)	**2 (66%)**
I see huge potential for using these interactive whiteboards with students and their learning	**2 (66%)**	1 (33%)	0 (0%)	0 (0%)	0 (0%)
There are relevant curriculum resources that can be leveraged through the use of SMART Board interactive whiteboards	**2 (66%)**	1 (33%)	0 (0%)	0 (0%)	0 (0%)
I predict that SMART Board interactive whiteboards will suit mostly students who are highly tactile and visual	0 (0%)	**2 (66%)**	0 (0%)	1 (33%)	0 (0%)
I predict that learning about SMART Board interactive whiteboards will take up too much of my professional time	0 (0%)	1 (33%)	**2 (66%)**	0 (0%)	0 (0%)
SMART Board interactive whiteboards require a lot of maintenance to operate in the classroom	0 (0%)	**1 (33%)**	**1 (33%)**	0 (0%)	**1 (33%)**
Teacher background knowledge of SMART Board interactive whiteboards is an essential requirement before using these tools as an instructional tool	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Student background knowledge of SMART Board interactive whiteboards is an essential	**1 (33%)**	0 (0%)	**1 (33%)**	0 (0%)	**1 (33%)**

requirement before allowing them to use these tools to express their understanding					

These results show that all of the teachers either agreed or strongly agreed that SMART Board interactive whiteboards are able to support a variety of instructional approaches to teaching concepts, that there is tremendous potential for using the SMART Board interactive whiteboards with students and their learning, that there are relevant curriculum resources that can be leveraged through the use of SMART Board interactive whiteboards, and that teacher background knowledge of SMART Board interactive whiteboards is an essential requirement before allowing them to use these tools as an instructional tool. Most teachers were unsure if SMART Board interactive whiteboards are best used for whole group instruction, while one teacher disagreed with this statement. Two teachers agreed that SMART Board interactive whiteboards would suit mostly students who are highly tactile and visual, while one teacher strongly disagreed. Conversely, two teachers disagreed that learning about SMART Board interactive whiteboards would take up too much of their professional time, while one teacher agreed. For the remaining two statements (SMART Board interactive whiteboards require a lot of maintenance to operate in the classroom and student background knowledge of SMART Board interactive whiteboards is an essential requirement before allowing them to use it to express their understanding), the responses were equally distributed, with one teacher agreeing, one disagreeing, and one stating they were unsure.

The second question in the survey was similar in that it asked teachers to indicate whether they agreed or disagreed with a number of statements relating to professional development. Only two teachers responded to the first two statements, while the remaining statements were answered by all three participants. The results are shown in Table 8 below.

Table 8: Initial Teacher Opinions Regarding Professional Development

	Strongly agree	Agree	Disagree	Strongly disagree	Not sure
I currently don't use technology that much in my classroom	0 (0%)	0 (0%)	**2 (100%)**	0 (0%)	0 (0%)
My current comfort with technology will significantly determine my chances of using the SMART Board interactive whiteboard effectively	0 (0%)	**1 (50%)**	**1 (50%)**	0 (0%)	0 (0%)
I learn best by watching and observing first, then trying out something new	0 (0%)	**3 (100%)**	0 (0%)	0 (0%)	0 (0%)
I learn best by tinkering or playing with the software	**1 (33%)**	**2 (66%)**	0 (0%)	0 (0%)	0 (0%)
I am extremely uncomfortable when people watch me using technology	**1 (33%)**	0 (0%)	**2 (66%)**	0 (0%)	0 (0%)
I think it is important to show parents and students how I learn	0 (0%)	**1 (33%)**	**1 (33%)**	0 (0%)	**1 (33%)**

These results show that all teachers either agreed or strongly agreed that they learn best by tinkering or playing with the software and that they learn best by watching and observing first then trying out something new. All teachers disagreed that they currently don't use technology that much in the classroom. Two teachers disagreed that they were extremely uncomfortable when people watch them using technology, while one teacher strongly agreed. With regards to current comfort level, one teacher agreed and one teacher disagreed that their current comfort with technology would significantly determine their chances of using the SMART Board interactive whiteboard effectively. Similarly, results were widely distributed with regards to whether it is important to show parents and students how they learn with one teacher agreeing, one disagreeing, and one unsure.

The remaining questions were all open-ended responses. The first question asked teachers if they had any suggestions of ways ILS could have further supported their professional development needs throughout this project. The results were as follows:

- "I would have liked more opportunities to go out and see teachers using SMART Boards in their classrooms."
- "Additional in-school visits focused on practical ways to use the SMART Board within the classroom may have been helpful."
- "More visits to the school to 'check up' on how things were going."

Teachers were also asked to describe the value they thought the SMART Board interactive whiteboards could have for them as teachers. Responses included the following:

- "I think it can be very valuable. For example, whenever I plan a lesson or activity now, I am always thinking about how I might be able to use the SMART Board to enrich it."
- "I am a teacher who is relatively new to the profession; therefore, I feel that the exposure to SMART Boards has better prepared me for the future and the direction in which schools are heading with technology."
- "Our teachers are reflecting on their teaching practice and considering new ways to best meet student learning needs."

Additionally, teachers were asked what constraints or obstacles they felt needed to be overcome before SMART Board interactive whiteboards could be effectively used within the school. Responses included:

- "Space and having to set it up each time it's been in another room. - Cords; especially with our population of students (in wheelchairs, walkers, limited mobility, etc.) - one point of contact - items falling from the tray - difficult for some students to reach and move objects - size of menu bar icons (can they be enlarged?) so kids with really poor fine motor can still manipulate them - Front projector shadow (difficult for our students to adapt) which leads to issues with costs/affordability for a rear projector - I would probably use it more if it was a permanent fixture in my class."
- "I teach in a multi-grade behavioural classroom and often I found the SMART Board to be a distraction to my students. Some would perseverate on it while others would be unable to attend to their own work when other students were using the SMART Board. Most of my students are only in my classroom for 4-6 weeks at a time. For this reason, I found that with the limited exposure these students had with the SMART Board it was difficult for them to achieve the level of independence with its uses and capabilities. I often ran into students becoming frustrated with the SMART Board not accurately responding to their touch."
- "Some of lower functioning students require a lot of supervision and direction."

Related to this question, teachers were also asked how they would like to see the SMART Board interactive whiteboard used in their classroom or school. Suggestions included:

- "As a centre. As a large group teaching tool. As a small group teaching tool. As I would use chart paper, a whiteboard or chalkboard. As the calendar, agenda, weather graph, storyboard, for language arts, for math, for science, for art."
- "If there is a time when I am teaching in a school with students who are with me for the entire year, I would love to have the use of a SMART Board again. However, within the special setting where I currently teach I don't feel that I was able to use the SMART Board to its true potential."
- "In a variety of ways -- e.g. whole group instruction, centres."

Finally, teachers were asked to provide any additional comments, thoughts or suggestions. Two teachers provided feedback, which included the following remarks:

- "I had a lot of fun learning how to use the SMART Board. It wasn't as intimidating as I thought it would be, but I found that my time to explore SMART's Notebook software and all the possibilities of how to use it in my class was really limited. I had a very busy class with such unique and varying degrees of ability; therefore, I didn't use it as much as I would have liked to. I really appreciated the teacher resources on www.smarttech.com. They were very helpful and save a lot of time."
- "I am very grateful for having had the opportunity to participate in this SMART Board project and feel that this learning experience was invaluable."

Teacher Journals

Throughout the course of the study, teachers were also asked to keep a weekly journal as a way to record how they integrated the SMART Board interactive whiteboards into their classroom and how their teaching styles evolved as they discovered new ways to incorporate the SMART Board interactive whiteboard into their classroom instruction (see Appendix C). Teachers were asked to write a few sentences each week relating to five different topics, which included the following:

- Ways that I used the SMART Board interactive whiteboard today/this week

- The impact I observed on students

- The impact I observed on my teaching practice

- Issues I encountered

- Other comments

Rather than replicating all the journal entries, the following is simply a summary of the findings. Overall, both teachers reported a high level of success with incorporating and using the SMART Board interactive whiteboards in the classroom. Both reported a high level of student satisfaction and stated that they would like to use the SMART Board interactive whiteboard in future classes if made available. The journal entries showed an increase in comfort level for both teachers as they became more familiar with the SMART Board interactive whiteboard and received positive feedback from the students. As the year progressed, some of the initial issues with the SMART Board interactive whiteboard were overcome (e.g., learning how to use various functions), while new ones arose (e.g., pens falling off tray) and others remained a constant issue (e.g., accessibility for students in wheelchairs). The SMART Board interactive whiteboard was used in a number of different ways and was incorporated into the classroom during a wide variety of assignments. Overall, the SMART Board interactive whiteboard was seen as a very positive addition to the classroom setting and only a few suggestions were made that could make this learning experience even better in the future.

The initial impression of the SMART Board interactive whiteboard from both the students' and teachers' perspective was positive, as can be seen from the following journal entry:

Dr. Gordon Townsend SMART Technology Research Project	
Ways that I used the SMART Board interactive whiteboard today/this week	This week I introduced the students to the SMART Board interactive whiteboard. This involved showing them the basic components of the device and their uses. After demonstrating how to do a few key functions on the SMART Board interactive whiteboard I invited the students to each come up and attempt to do some of the same things I had demonstrated for them.
The impact I observed on students	Students were very excited about our new SMART Board interactive whiteboard because none of them had ever used

	or observed one before. They were all very eager to have a chance to touch and interact with it in the ways that I had shown them.
The impact I observed on my teaching practice	It didn't take me long to realize that this was going to be a very useful and engaging teaching tool within my classroom. By watching the faces of my students and their reactions when they were exploring its capabilities I knew my students would want to use the SMART Board interactive whiteboard every opportunity they got.

As the year progressed, both the students and the teachers continued to enjoy using the SMART Board interactive whiteboard for a variety of projects and assignments. Examples of these projects included:

- Book Study on 'The Arctic'. Students are creating a story based on the Eric Carle style, called *Puffin, Puffin, What Do You See?*
- Made a 'feelings' graph.
- School assembly: Used the SMART Board interactive whiteboard to present student work that was done with our Artist in Residence. The students created a story like the Eric Carle *Brown Bear Brown Bear* series by using their Arctic 2-dimensional clay plaques. One student was able (tall enough) to turn the page on the SMART Board while the audience read the story.
- Easter activities for Assistive Technology presentation: Students matched mixed up number cards to corresponding Easter eggs with numbers on them. Pin the tail on the bunny move the tail. Trace the path for Peter Cottontail to find his eggs.
- Alphabetical Flowers: Flower stems with mixed up lower case flowers along the top of the sheet. Students had to put the flowers in alphabetical order.
- Used an interactive activity from the ECOKIDS website for Earth Day celebration with elementary and secondary students.
- Math lesson using simple addition. Used it as a center for one student.
- Students as partners: Students had to beat the clock to match numbers, objects, and number words.
- I worked with a small group of students using templates from Notebook to help them learn the process of multiplication skills.

The observed impact of these projects on the students was positive and included comments such as:

- Curious, engaged, and excited.
- All of the students were eager to use the SMART Board and were very engaged in their learning.
- Students had fun. They LOVED that their finger could be magic and print with different colors (and not even hold the marker)…They haven't quite figured out how this works!
- Allowed for student success.

- Students were very engaged and eager to touch and use the SMART Board. I continue to see looks of amazement from students as they use and explore the many applications.
- All ages of students (and adults) were engaged and wanted to participate.
- Students liked the ECOKIDS activity so much that they wanted to do it again.
- My student seemed to enjoy using the SMART Board. They were more interested in doing this type of activity on the interactive board than with pencil and paper.
- Students totally loved the insect images I was able to find for graphing in the Gallery. These particular students would not have been able to do the pencil/paper task that this activity originated from. The SMART Board made it possible.
- They had a riot! A lot of positive turn-taking and supporting each other. They loved the interactive flash stop watch.
- All of my new students were very intrigued by the SMART Board. They were all very eager to use it. Every one of the students in my class was pleased with how easy the SMART Board interactive whiteboard was to use.
- Students are starting to ask more frequently to do work on the SMART Board. They are beginning to realize that it's not just another piece of furniture in the classroom.

In addition to student satisfaction, the teachers also noted that the SMART Board interactive whiteboard had a positive impact on their teaching practice. Comments surrounding this impact included:

- I didn't take me long to realize that this was going to be a very useful and engaging teaching tool within my classroom. By watching the faces of my students and their reactions when they were exploring its capabilities I knew my students would want to use the SMART Board every opportunity they got.
- Thinking that the possibilities are only as limited as my imagination AND time.
- First time using it at an assembly. Plan to use at future assemblies.
- Great for kids with occupational therapy (fine motor) issues. Will consider using the SMART Board for Handwriting Without Tears program.
- I found this lesson on www.smarttech.com, so I didn't have to re-invent the wheel! Now I just need to find time to cruise through all those great resources.
- Multi-grade classroom, allows me to differentiate instruction and easily provide lessons to accommodate the individual needs of my students.
- In using the SMART Board as a centre with my students, I was able to have them working independently while I attended to individual teaching with my other students.
- I don't always need to create an activity. There are so many on the Web. This will save tons of planning and preparation time.
- The graphing activity was initially a pencil/paper task that I re-created on the SMART Board. It was fun to create and didn't take a lot of time. I think I would like to do this more often.
- I will probably reduce my photocopying and pencil/paper tasks significantly if I can continue to reproduce them on the SMART Board.

- I am feeling a lot more comfortable in using the SMART Board myself, and I feel this new found confidence is positively impacting my teaching practice.
- When planning classroom activities, I am automatically starting to think of how I can incorporate the SMART Board.

Despite these overwhelmingly positive remarks, there were a few common issues that were addressed in the journal entries. Some of these issues included the following:

- Need to get an Internet cord long enough to use around the classroom.
- Time to 'play' is very limited because of a very busy classroom.
- One day a week may be all I will have time for because each student is at a different level of ability and physical functioning and cannot use SMART Board independently.
- Took a while for students to figure out how not to create a shadow.
- Easier for students to use their fingers to write. More control than the marker provided.
- Only one point of contact, so students were impatient waiting turns.
- Dealing with the issue of the 'shadow' and teaching students how to stand to the side.
- Too many cords for kids who are in walkers and wheelchairs and who are unstable independent walkers.
- Need something for kids who can't reach images at the top.
- Need to lower interactive board. Took a while for students to figure out how not to create a shadow.
- Most of my students require support (hand-over-hand, or stabilizing muscle movements).
- Wheelchair arms at a certain height bump the bottom of the SMART Board.
- SMART Board markers tend to fall off easily.
- Easier for students to use their fingers to write. More control than the marker provided.
- Issues with students who want to rest their palms while printing.
- I continue to use a rubber eraser on a pencil and a rubber-tipped pointer
- Because I share the SMART Board with another teacher, it is becoming inconvenient to have to set up the SMART Board each time. Sometimes I don't have extra time in the day to set it up, so it doesn't get used as much as it could. Usually once or twice a week.
- Having to re-type a worksheet. I need a scanner.

Interview Results

In addition to the surveys and journal entries, both teachers were also asked to participate in a face-to-face interview with the specialist and researcher from ILS. This was requested so that the teachers had an open opportunity to discuss their experiences and share their thoughts in their own words. The interview lasted approximately 30

minutes and included a number of questions that revolved around how the SMART Board interactive whiteboard was used, what impact it had on the students, and what impact it had on the teachers.

To start the interview, teachers were asked what encouraged them to initially get involved in the project. Both stated that it was an idea initially introduced to them by the school's principal, and they felt it would be an interesting tool to try out. Since the Alberta Children's Hospital, and therefore the school, was going to be moving to a new location in the near future, it was also believed that trying out a new technology such as the SMART Board interactive whiteboard would also inform decisions as to how the new classrooms should be arranged. By trying out the SMART Board interactive whiteboards in the old location first, decisions could be made based on the success of the pilot project.

Teachers were also asked to describe how often they used the SMART Board interactive whiteboard and what they typically used it for. Both teachers stated that they used the SMART Board interactive whiteboard approximately two days a week in a multi-aged class and primarily used it for one-on-one instruction, as a learning center, or within small groups. One teacher had also used it during an assembly in which students were able to present their work to their parents on the SMART Board interactive whiteboard. This was described as being a great success for both the students and parents. Both teachers used the SMART Board interactive whiteboard for a variety of teaching lessons across virtually all subjects, including math, spelling, language, and printing. Both teachers also heavily used materials made available to them on the Internet, which both saw as being a tremendous help.

With regard to student impact, both teachers stated that their students responded very positively to the addition of the SMART Board interactive whiteboard in the classroom. Both teachers felt that the SMART Board interactive whiteboard provided the

students with a sense of independence and that the technology aspect of the SMART Board interactive whiteboard provided a novelty and 'fun' element to the learning environment. Since the SMART Board interactive whiteboards can only process one contact point at a time, they were primarily used in one-on-one instruction which meant that some of the students became impatient when waiting for their turn. While the distraction of the SMART Board interactive whiteboard and impatience of the students was seen as a negative aspect of the technology, it demonstrated that the students were eager to use the SMART Board interactive whiteboard and enjoyed the times when they were able to use it themselves. The teachers noted that the students seemed to enjoy doing their assignments more when they were able to complete the assignment on the SMART Board interactive whiteboard compared to similar assignments done on paper. It was suggested that due to the interest the students' showed towards the SMART Board interactive whiteboard, more assignments should be conducted on the SMART Board interactive whiteboard in future classes.

The teachers also noted that it took approximately half an hour to teach the students how to properly use the SMART Board interactive whiteboard. Once the students had learned the basic functions, they were able to complete tasks with little or no difficulties and were even able to teach other students the same skills. The ease of use was seen as a very positive attribute of the SMART Board interactive whiteboard since some of the students were low-functioning and asking them to learn a new concept on a new technology was already a difficult task.

Teachers were also asked to comment on the impact the SMART Board interactive whiteboard had on their own teaching practice. Both teachers felt that the SMART Board interactive whiteboard had made it easier to manage their classrooms and prepare for lessons. While they were helping other students in the class, individual students could use the SMART Board interactive whiteboards on their own, which made class

management easier for both teachers. Since the SMART Board interactive whiteboard was interactive and enhanced the learning environment, the students could participate more in class and contribute to the lesson themselves without having to rely solely on the teacher for assistance and instruction. Because of these qualities, the SMART Board interactive whiteboard was seen as a very positive addition to the classroom.

When asked if they had been provided with adequate professional development, both teachers felt as though they would have benefited from additional support. Both teachers would have liked more time to simply 'play' with the SMART Board interactive whiteboard on their own in order to learn the various features. Being able to observe another teacher using the SMART Board interactive whiteboard was very helpful for both teachers, and they felt that additional exposure to how other people use the SMART Board interactive whiteboard would have been beneficial. Both teachers also felt that they would have appreciated more time to simply talk with each other and other teachers using the SMART Board interactive whiteboard to discuss various issues that arose and to learn different ways to use the SMART Board interactive whiteboard from each other. Constant updates and information on different features or assignments was also seen as something that could be provided in the future in order to optimize the use of the SMART Board interactive whiteboard in the classroom.

Overall, both teachers stated they would definitely use the SMART Board interactive whiteboard in the future if it was made available, but both teachers felt that a few roadblocks would have to overcome first. Accessibility for students in wheelchairs and walkers was seen as a consistent problem in the classroom, and it was suggested that if the SMART Board interactive whiteboard was on an adjustable stand mounted on the wall it would help all students. While the size of the screen was seen as a positive characteristic, it was noted that the SMART Board interactive whiteboard was often either too high to reach or too low for wheelchairs to fit under it. An easily adjustable

screen was recommended to address this issue. In addition to the height issues, the number of cords on the floor also limited access for students in wheelchairs. It was suggested that the wires should either be hidden along the wall or the SMART Board interactive whiteboard should utilize wireless technology in order to reduce the number of cords being used.

The most common problem encountered by the students and teachers revolved around the front-projection screen and the shadows it created when people stood in front of the SMART Board interactive whiteboard. With accessibility already limited due to cords on the floor and the support stand getting in the way of the wheelchairs, working around the shadows often created a frustrating environment for the students to work in. When navigating around the shadows, some students with poor hand motor skills found it difficult to control the pointer and manipulate objects on the screen. In addition, having only one point of contact made it difficult for some of the students who needed to support their hand while writing. In order to deal with these issues, it was suggested that a rear projection or LCD screen should be used that ideally would allow for multiple points of contact.

Finally, both teachers were asked to describe how they would like to see the SMART Board interactive whiteboards being used in an ideal teaching environment. Both teachers stated they would like to have their own SMART Board interactive whiteboard instead of being required to share it in order to reduce the issues relating to transporting it to different classrooms. It was also suggested that the SMART Board interactive whiteboard should always be available and introduced at the beginning of the year so students could learn the skills necessary to use it and get used to having it in the classroom at all times. Having a larger classroom with more space to work around the SMART Board interactive whiteboard was also seen as something that could be improved. Using it for simplified tasks such as showing the time, weather, and having a

class calendar was also seen as something that the students could benefit from. Overall, both teachers agreed that in order to use the SMART Board interactive whiteboard to it's fullest potential, they would like to have the SMART Board interactive whiteboard available every day for every class and used in as many assignments as possible.

Conclusions

While the results from this study are not representative of all students or teachers using SMART Board interactive whiteboards, this project provides an interesting examination into how this technology can be used in a unique environment such as the Alberta Children's Hospital with students who are encountering various physical and mental difficulties. The lessons learned from this project will not only inform future decisions regarding the use of this technology within similar environments but can also be used to address a number of issues relating to the use of the SMART Board interactive whiteboard within any educational setting. It is hoped that by studying how the teachers and students have used the SMART Board interactive whiteboard at Dr. Gordon Townsend it will provide valuable information on how to better incorporate this technology in future educational settings.

Student Impact

Based on the results from this study, it is apparent that the students involved in this project viewed the SMART Board interactive whiteboard as a very beneficial and positive addition to their learning environment. Every student who participated in this study enjoyed being able to use the SMART Board interactive whiteboard (Table 2) and more specifically, students highly enjoyed the ability to get involved with the SMART Board interactive whiteboard, the large screen, and how their teacher used it within the classroom (Table 1). Being able to see pictures displayed alongside text as well as being able to manipulate the images with their fingers made the SMART Board interactive whiteboard an interactive and engaging tool for the students. The vast majority of

students felt the SMART Board interactive whiteboard helped them learn while giving them the chance to teach their classmates as well (Table 2).

Parents of the students involved also felt that the addition of the SMART Board interactive whiteboard to the classroom was a positive experience for their children. From their perspective, parents felt that the large screen was a positive characteristic of the SMART Board interactive whiteboard and that it was more in tune with their child's learning style and physical needs (Table 3). Parents also stated that the SMART Board interactive whiteboard not only helped their son/daughter learn but also enabled them to get involved in the learning process themselves (Tables 3 and 4). Overall, parents felt that the SMART Board interactive whiteboard was a great new tool that had an enormous potential for not only their children but for future students using the technology.

While most students offered no suggestions as to how the SMART Board interactive whiteboard could be improved, some students felt that since only one student could use the SMART Board interactive whiteboard at a time, it sometimes took a long time before they could use the technology on their own. Other students had difficulties reaching some of the icons displayed at the top of the screen and struggled when trying to navigate around the shadows created by the front projector. The teachers involved recognized that some students had difficulties using the SMART Board interactive whiteboard if they were in a wheelchair or using a walker since there were a number of chords attached to the screen. Teachers also recognized that some of the students with motor skill difficulties became frustrated when they were unable to rest their hands on the screen since the SMART Board interactive whiteboard only allowed for one point of contact. If a backlit or LCD screen was available that that utilized wireless technology, allowed for multiple points of contact and was easily adjustable, future students could

have an even more positive experience using the SMART Board interactive whiteboard within their classroom.

<u>Teacher Impact</u>

Throughout the course of this project the teachers involved spent a considerable amount of time incorporating the SMART Board interactive whiteboard into their classroom. While teachers initially stated that they did not use technology that often in their classroom, both teachers responded positively to learning a new technology and integrating it into their lessons (Table 6). Despite the obvious time commitment, both teachers agreed that this was a positive venture and that the lessons learned from this project would inform future practices and create an even greater learning environment for future students.

Teachers agreed that the SMART Board interactive whiteboards were able to support a variety of instructional approaches to teaching concepts and that a huge potential exists for using SMART Board interactive whiteboards with students (Table 7). Most teachers did not feel that learning about the SMART Board interactive whiteboard would take up too much of their time and one teacher even suggested that since there are so many activities available on the web, "this will save tons of planning and preparation time." Additionally, one teacher felt the SMART Board interactive whiteboard would "probably reduce my photocopying and pencil/paper tasks significantly if I can continue to reproduce them on the Web." Rather than being viewed as a burden on the teacher's time, the SMART Board interactive whiteboard was seen as a potential time saver by the teachers involved in this project.

In regard to professional development, both teachers stated that while they appreciated the training provided by ILS and enjoyed being able to visit other teachers to watch how they used the SMART Board interactive whiteboards within their classrooms, they would have benefited from additional support. Both teachers felt that they would

have been more comfortable using the SMART Board interactive whiteboard if they were simply given more time to 'play' with the technology on their own. It was also suggested that time to talk with each other and other teachers using the technology would have allowed them to discuss problems encountered and exposed them to different ways of using the SMART Board interactive whiteboards effectively with their students.

Overall, both the teachers and students viewed this project as being a very positive experience with only a few suggestions made to improve the technology. Based on the results from this study, it is suggested that SMART Board interactive whiteboards can play a very valuable role in today's classrooms, especially within unique learning environments such as that of Dr. Gordon Townsend. With a few adjustments made to improve accessibility for students in wheelchairs and with motor skill difficulties, the SMART Board interactive whiteboard has the potential to play an even greater role in providing students with an interactive and dynamic learning environment.

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Appendix A

Student Survey - Please take a few minutes to answer the following questions about the SMART Board interactive whiteboard. There are no right or wrong answers, so feel free to tell us what you really think. All of your answers will be kept confidential. Thank you for helping us out!

1 Please tell us whether you enjoyed or didn't enjoy the following things about the SMART Board interactive whiteboard. Put a checkmark in one box for each line.

	Really enjoyed	Enjoyed	Didn't enjoy
My ability to get involved with the SMART Board interactive whiteboard	☐	☐	☐
The large screen	☐	☐	☐
How my teacher used it with me	☐	☐	☐

2. What was your favorite thing about having the SMART Board interactive whiteboard in your classroom?

3. Was there anything you didn't like about the SMART Board interactive whiteboard?

4. Do you **agree** or **disagree** with the following statements about the SMART Board interactive whiteboard? Please put a check mark in one box for every statement.

	Agree	Disagree	Don't know
The use of the SMART Board interactive whiteboard helped me learn	☐	☐	☐
I liked the SMART Board interactive whiteboard because it is the way I like to learn	☐	☐	☐
I liked being able to use the SMART Board interactive whiteboard	☐	☐	☐

Having the SMART Board interactive whiteboard in my class helped me to "catch-up" on my work	☐	☐	☐
The SMART Board interactive whiteboard gave me a chance to teach my classmates	☐	☐	☐

That's it, you are now finished! Thank you for taking the time to give us your feedback.

Appendix B

Dr. Gordon Townsend **SMART** Technology Research Project
Parent Survey

1. Based on your own perceptions, please indicate the extent to which you think your child enjoyed or did not enjoy the following aspects of the SMART Board interactive whiteboard.

	Agree	**Disagree**	**Don't know**
The use of the SMART Board interactive whiteboard improved my son/daughter's ability to get involved in the learning process	☐	☐	☐
My son/daughter enjoyed learning with the large screen on the SMART Board interactive whiteboard	☐	☐	☐
My son/daughter benefited from their teacher(s) utilizing the SMART Board interactive whiteboard in their teaching practice	☐	☐	☐

2. Based on your own perceptions, please tell us whether or not you agree with the following statements concerning your child's experience with the SMART Board interactive whiteboard

	Agree	**Disagree**	**Don't know**
The use of the SMART Board interactive whiteboard helped my son/daughter learn	☐	☐	☐
The use of the SMART Board interactive whiteboard was more in tune with my child's learning style	☐	☐	☐
The use of the SMART Board interactive whiteboard was more in tune with my child's physical needs	☐	☐	☐
My son/daughter liked the interactivity of the SMART Board interactive whiteboard	☐	☐	☐

3. Do you have any additional comments about the use of the SMART Board interactive whiteboard that you would like to add?

Appendix C

Teacher Journal Entry Sheet

Dr. Gordon Townsend SMART Technology Research Project	
Date:	
Ways that I used the SMART Board interactive whiteboard today/this week	
The impact I observed on students	
The impact I observed on my teaching practice	
Issues I encountered	
Other comments	
Dr. Gordon Townsend SMART Technology Research Project	
Date:	
Ways that I used the SMART Board interactive whiteboard today/this week	
The impact I observed on students	
The impact I observed on my teaching practice	
Issues I encountered	
Other comments	