Universal Design for Learning in Practice

Report on the Use of the SMART Board interactive whiteboard to Enhance Literacy in Children with Learning Disabilities

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Introduction

> *The success of technology has more to do with people than machines. All the right parts and pieces together won't work miracles by themselves. It is people who make technology powerful by creatively using it to fulfill their dreams (Alliance for Technology Access, 2000)*

Technology offers exciting possibilities to create vast opportunities for student learning. From WebQuests to multimedia presentations, from e-mails to pod casting, our ability to create and communicate ideas and information are endless. To help support teachers in the overwhelming task of "where do I start", it important to have a clear focus of where to start and how to incorporate the technology into the curriculum.

Purpose

In a study on attitudes of middle and high school Internet users conducted by Levin and Arafeh (2002), interviews of teacher candidates and their experiences found that their education experiences, for the most part, did not include technology integration in education, that there was a lack of background in technology integration experiences and that many support text material does not include integrated technology (Cavanaugh, 2006).

Today's concept of literacy goes beyond only paper to include reading form computer screens and personal devices, and include media, technology, information, and other critical literacies (Semali, 2001 as cited in Cavanaugh, 2006.)

The Internet, word processors, e-mails, and other hardware and software are continuing to reshape the nature of literacy. Teaching literacy to children today involves teaching both 'traditional' literacy and how to read and produce the kinds of texts typical of the emerging information and multimedia age. (Semali, 2001).

In this study, we incorporated the principles of Universal Design for Learning® and a technology integration model to examine how teachers can enhance curriculum with the inclusion of technology built into a specific course of study. Specifically, we wanted to explore how educators

could use the SMART Board™ interactive whiteboard as an extension of student learning. We felt the best way to support us in incorporating the technology into lesson plan design was to use *The Technology Integration Model* (Robyler & Schwier, 2003). The teachers also wanted to explore how the use of the SMART Board interactive whiteboard impacts student learning in the language strands of listening, speaking, reading, writing, viewing and representing. The study was done through a practitioner's point of view, showing a method of how technology was built into the unit at the planning stage and how we used specific technology to enhance the learning for all the types of learners in the classroom.

Background

Universal Design for Learning

Universal design is a process for designing general products or structures in such a way as to reduce barriers for many individuals with or without disabilities and to increase opportunities of the widest possible range of users. Because the consumers are groups of individuals, universal designs are engineered for flexibility, and to anticipate the need of alternatives, options, and adaptations (Burgstahler, 2005).

Designing technology devices with the principles of universal design in mind is intended to address barriers that exist for technology use in the classroom. Applying these principles to the design, development and presentation of curricular materials can ensure that students with varying forms of abilities have access to content information. The universal design approach is used to create environments that are designed from the outset to accommodate individuals with a wider range of abilities and disabilities than can be accommodated by traditional applications (Burgstahler, 2005). Most content, particularly in the core academic areas, is presented through print-based mediums such as textbooks, worksheets and lectures. Students who cannot read well or who have difficulty with memory or attention, including students with intellectual disabilities, do not have access to the content presented through these methods and, thus, will not have the opportunity to learn the content. When principles of universal design are applied to curriculum development, curriculum adaptations, such as modifications to how the content is

represented, how it is presented or how students engage with the content, barriers to learning are addressed (Ashton, 2005).

The advantage to universal design for learning is that it takes place before materials are made and a teacher decides to teach. Accessibility is built in from the beginning, thus eliminating the need for many adaptations. Because the curriculum design and accommodations for the learning environment are made at the outset, learning is accessible to the widest range of students. Universal Design for Learning (UDL®) relies on three distinct principles: 1) multiple means of representation to give learners various ways of acquiring information and knowledge 2) multiple means of expression to provide learners with alternatives for demonstrating what they know 3) multiple means of engagement to tap into learners' interests, offer appropriate challenges and increase motivation (CAST, 2002). Our purpose was to show how the SMART Board interactive whiteboard could be used as an extension to student learning and be embedded in curriculum to improve student learning and motivation.

The Technology Integration Model

To implement the principals of Universal Design for Learning, we made use of *The Technology Integration Model* (Robyler & Schwier, 2003). This model correlates directly to the guiding principals of universal design for learning and provides teachers with specific focus points when planning technology integration into the curriculum. Although they are listed as five phases, they do not need to be used sequentially because they are intended for teachers to use to analyze their instructional situations to ensure appropriate technology use (Robyler & Schwier, 2003). This model asks questions in each phase of development that were used to guide the teachers to make sound technology integration decisions from the planning to the evaluation stages of this study. This model has five phases, which are listed below:

Phase 1: Determining the "Relative Advantage" – Why use technology?

Phase 2: Planning Assessments – What are appropriate assessment strategies?

Phase 3: Planning Instruction – What are appropriate integration strategies?

Phase 4: Logistics – Preparing the classroom environment and instructional materials

Phase 5: Evaluating and revising integration strategies – How do I know it's working?

Research Design

This study was conducted as an action-research study. It took place in the classroom of one of the researchers and the other researcher was also assigned to this classroom. It is a qualitative study, which attempts to show the reader how the students interacted with the technology and the students' thoughts and opinions of the process. Much can be learned from close examination of the lived experiences of educators and students when employing new methods of instruction in the classroom.

In reference to generalization, we are not suggesting that all or any of the approaches or techniques or materials used can be generalized to other situations, and we caution the reader that the findings are context-bound. We merely hope that the study will illustrate the importance of using the framework of universal design principles and the technology integration model in one context, and provides an example of how one school team used this framework to explore the integration of the SMART Board interactive whiteboard into the classroom.

In an attempt to overcome researcher bias, the unit structure and design was shown to five other teachers in the school to provide feedback on the design and ease of implementation. As well, parents were invited to the classroom for a demonstration of the SMART Board interactive whiteboard and to sign a parent consent form regarding this research study.

Research Method

Methodology

Roblyer & Schwier (2003) state that there are two viewpoints related to the methodology of teaching technology in schools. There are the directed instruction strategies, the objectivist view, as found in some software programs that are drill and practice type activities, and there is the constructivist viewpoint, which employs constructivist strategies such as WebQuests that are conducive to exploratory learning. There are meaningful roles for both directed instruction and constructivist strategies, and the technology application associated with them (Roblyer & Schwier,

2003). We consider that both directed instruction and constructivist strategies were necessary with the SMART Board interactive whiteboard integration. There were four transitional phases to this study: 1) display of the technology in the classroom 2) teaching strategies of how to use and using the SMART Board interactive whiteboard 3) collaboration and student learning and 4) hands on learning. The first two points were directed and the last two constructivist.

Participants

This study was conducted in the school where we teach in the grade six classroom. The researchers were the grade six teacher and the learning assistance teacher supporting the classroom. Five other teachers within the school were also asked to read through the unit design and answer a questionnaire about the unit created.

Setting

The study took place over approximately four months, while the unit was being taught.

The study was conducted during the Language Arts periods during the week at school in both the grade six classroom and the school's computer lab. Various strands of the Middle Years English Language Arts curriculum were examined so that appropriate placement of technology integration and objectives were set at the planning stage. Close attention was paid to the use of a novel study for a base to springboard other learning activities from the strands of the curriculum. We also explored media awareness by using parts of the novel to springboard ideas. The SMART Board interactive whiteboard was used as a platform from which to springboard these ideas.

This study was co-taught by the grade six teacher and the learning assistance teacher. Although the classroom teacher holds the primary role in the classroom, the course outline, course content and marking was a shared responsibility of both teachers. This classroom has students of varying disabilities, including a student with special needs who has an individualized program plan. Teachers worked closely to determine appropriate placements of students in small groups as well as team-teaching the whole classroom.

The Method

As mentioned previously*, The Technology Integration Model* was used as a framework for implementing universal design principles. The following shows the phases of this model and how we incorporated the curriculum unit plan into the structure of the model.

Phase One: The relative advantage of why we are using the technology.

- Lesson plans with interactive whiteboard technology, as well as computer applications of the use of the World Wide Web, PowerPoint® presentation graphics program and the use of e-book technology with this particular novel was incorporated into lesson design with student evaluation and assessment.
- Lessons focused in the areas of listening, speaking, reading, wiring, viewing, and representing; the six strands of the English Language Arts Curriculum.
- Media literacy was incorporated within the novel study's themes of homelessness, racial prejudice, and literacy. Media literacy was explored with the use of the SMART Board interactive whiteboard and the World Wide Web through whole-class, small-group and individualized instruction.
- Because of the case sensitive themes in this novel, it was important to use interactive whiteboard technology, because it is different than the teacher imparting his own opinion. The use of this technology allowed students ownership of their learning, because they were expected to explore the socially sensitive themes with a variety of media literacy resources and report back to share with teachers and groups on their own learning and opinions and experiences.

Phase Two: Planning appropriate assessment strategies (unit planning and design).

- Pre- and post-evaluation of students included the Edmonton Spelling Test, an informal reading passage from the Alberta Diagnostic reading test, and a short-form reading mastery test (Woodcock Reading Mastery Test).
- Authentic performance reflects skill in accurate real-world context. With multimedia products, it is important to include rubrics and checklists with student evaluation

throughout the unit plan's design and structure, because students are expected to take ownership in their learning. Rubrics and checklists were designed both in the unit planning stage and during the evolution of the lesson plans, as they were both teacher and student driven. Projects from students were evaluated with these rubrics and checklists, some made in the planning stages and some in the evolution of the unit.

As this novel study had been used in the classroom previously, some of the lesson design was already completed. This included chapter questions and answers, literature circle ideas/forms/rubrics and presentation ideas. Our task was to take these ideas, look at them from a Universal Design for Learning standpoint and determine the best options to meet each key area of offering multiple means of representation, engagement and expression. We looked to the website CAST®, which has a section on teaching which offered us a wealth of information in choosing appropriate methods of integrating the SMART Board interactive whiteboard and other technology into our lesson planning. This website, http://www.cast.org/teachingeverystudent/, offers tools, forms and ideas of how to put UDL into practice.

For our own professional development, the teachers also spent time before, during and after school familiarizing themselves with the SMART Board interactive whiteboard and the SMART Board software. We looked at many different websites that offered SMART Board interactive whiteboard lesson plans and decided which ones fit our unit profile. We attended two SMART Board interactive whiteboard sessions at two separate technology conferences offered in our city to get ideas on implementation and to see how other educators are using the technology.

An important area of our unit plan design centered around four distinct themes: gangs, illiteracy, homelessness, and racism/prejudice that presented themselves throughout this novel. We wanted to tie in media literacy with these themes so students could gain an awareness and appreciation for different forms of media, the messages that are sent to the audience with media and how media influences and forms our thinking. We incorporated lessons from http://www.media-awareness.ca/english/index.cfm and used interactive whiteboard technology to teach these lessons.

The culminating activity of the unit was the students' choice and student-centered. Each student worked on his or her own or with a group. They chose a theme and designed their research project around this. They were given choices of mediums to research and to design their project material and were asked to utilize the SMART Board interactive whiteboard to present projects. This allowed for students' creativity and practice with the SMART Board interactive whiteboard. Rubrics for the research project and presentations were given prior to the assignment, enabling students to take ownership of their projects.

Phase Three: Planning Instruction – appropriate integration strategies (unit implementation).

- Although instruction was given in the language arts period of the day, the unit is interdisciplinary in nature as it explores objectives in the computer/media literacy and health components of the core school subject areas.
- Instructional activities were a combination of whole class, small group, paired and individual. Initial activities with the SMART Board interactive whiteboard were whole-class and teacher-led to allow students an opportunity to explore and engage in using the technology. Students moved toward student-directed and small-group work as they began to research their projects/presentations. Activities performed by students were a combination of directed and constructivist in the following ways:
    - Preparation of SMART Board interactive whiteboard practice – whole-class, teacher-led
    - Teacher-led instruction and activities – small-group, paired, individual
    - Student-directed work – individual, paired and small-group
- An important aspect of this step is that enough time was given for students to get used to the technology before beginning a graded activity. This is why using the SMART Board interactive whiteboard was practiced in other subject areas, as well as Language Arts.

Phase Four: Logistics – preparing the classroom environment (orientation).

- Technology-based activities were mostly in the classroom, for small group and individual assignments the computer lab was used, especially to explore the World Wide Web and

to create projects. As some groups were preparing for a project with the SMART Board interactive whiteboard in the classroom, some were using other media forms such as preparing a PowerPoint presentation graphics program presentation, which was shown on the SMART Board interactive whiteboard.

- Technology resources required throughout the unit, such as the SMART Board interactive whiteboard, were used daily. Time to learn how to operate the SMART Board interactive whiteboard and how to teach students the SMART Board interactive whiteboard was worked into teacher schedules.
- The classroom was fitted for a hanging digital projector and was mounted in the classroom. A laptop had been purchased for the classroom to use in conjunction with the SMART Board interactive whiteboard in the classroom. The computer lab times allotted to the classroom were used for language arts during the course of the study to prepare for assignments.
- The teachers, staff and students initially spent time familiarizing themselves with the new technology. The SMART Board interactive whiteboard was then used extensively in the classroom during this time in the areas of Language Arts, Math, Social, Art and Computers with hands on experimentation by students. Conferencing with parents as they came to the school for mid-term report period allowed the teachers to give an orientation to the SMART Board interactive whiteboard so they understood what their child was working on and allowed us to review the contract with them and answer questions.

Phase Five: Evaluating and revising integration strategies (findings).

- Unit-plan design incorporated interactive whiteboard technology integration from the planning stage. Completed unit-lesson planning and student evaluation design was given to colleagues to review and offer feedback on unit plan design.
- Pre- and post-evaluation of students as mentioned previously. Participation in the study of the student permission to participate signed by parents.

- Self-reflection of teachers involved in the study. Teacher and student created rubrics and checklists. Student questionnaires at the conclusion of the unit were used as both a self-reflection and a check to see how the technology worked for them during the courses of the study.
- Evaluation of this unit with teachers and students occurred upon completion of students' research projects. At that time, revisions were considered as the teachers reflected on the unit and process feedback from other staff members.

A more detailed version of the Language Arts unit we used and reference to curriculum goals can be found in Appendix A.

Essential to the principles of Universal Design for Learning are the people with whom the technology is designed for. CAST, or the Center for Applied Special Technology, is a foundation dedicated to developing innovative, technology-based educational resources. It is made up of many different specialists in education (CAST, 2002). Within this website, they have built teacher resources to help teachers adjust the technology for different individuals in the classroom with varying abilities.

From this website, we made use of two templates. The curriculum barriers template helps teachers analyze where the potential barriers are in the planned curriculum materials and methods. This model highlights barriers created by the interaction between materials, methods, and students' weaknesses and shows opportunities missed in this interaction. The following chart shows an example of one we created.

Curriculum Barriers

Grade: 6
Teacher: Schmitz
Subject: Language Arts
Goal: SMART Board interactive whiteboard presentations

Materials and Methods	Student Qualities	Potential Barriers/Missed Opportunities
Novel	*Student a* —Low vision *Student b*—Loves computers *Student c*—Limited English	Difficulty seeing small text Textbook does not tap into this interest and skill Difficulty decoding and understanding the words' meanings
SMART board	*Student d*—Home problems	May not engage with material, distracted from listening
Internet Research	*Student a* —Low vision *Student c*—Limited English	Difficulty seeing small text Difficulty decoding and understanding the word meaning
Group Presentation	*Student b* —Strong leadership and collaboration skills *Student e* – easily discouraged *Student I* – poor organizational skills	Won't draw on leadership and collaboration skills. May feel intimidated by group Not contributing to group project

The Universal Design for Learning class profile maker helps teachers recognize the diversity in the classroom. This template allows teachers to analyze each student's strengths, needs and interests so that they are not grouped into broad categories, like who is more able and who is less able. The following chart shows an example of this.

Class Learning Profile

Grade: 6
Teacher: Schmitz
Subject: Language Arts
Goal: SMART Board interactive whiteboard presentations

	Students' Strengths	**Students' Weaknesses**	**Students' Preferences/Interests**
Recognition (Learning "what")	*Students B & G* — Thorough knowledge of computers	*Student A*—Low vision *Student C*—Limited English proficiency *Student C*—Difficulty discerning key concepts when reading or listening	
Strategy (Learning "how")	*Student B & G*—Computer wiz; familiar with electronic encyclopedia and the Web *Student H*—Very good at oral presentations	*Student I*—Difficulty with organization when doing a project or paper	
Affect (Learning "why")	*Student F*—Extremely persistent through challenges *Student B*—Leadership/works well in collaborative groups	*Student E*—Easily discouraged, afraid to take risks *Student D* —Personal concerns, often distracted	*Student B*— Work with graphics/images *Student G*—Loves computer graphics, the Web, any new software program

Data Collection and Analysis

Data was collected through student questionnaires, finished work projects, and observations of the students while using technology in different environments with both description data and event data gathering. Teacher questionnaires and personal reflections of the teacher researchers were also closely examined. Through this data collection, careful analysis of emerging themes from the results showed the benefits and drawbacks of this study.

Having a sound implementation model that centers on key questions was critical in the task analysis of this project. There is obvious value in having flexible Universal Design for Learning assessment, as there is much flexibility. Applying UDL assessment allows for flexibility in presentations, expression, supports and engagement. Because of the inherent capacity of new

technologies like interactive whiteboards, teachers can provide dynamic assessments that show the ongoing processes of learning. There are barriers in some of the more traditional forms of assessment, including accommodating individual differences, media constraints, lack of appropriate supports and lack of integration with curriculum (CAST, 2002). Allowing for flexibility in presentations, how students express their ideas, and flexibility in how students are engaged, greatly influences the outcomes of authentic assessment.

Analysis of Results

This section reviews results from the student and teacher questionnaires and the work projects the students completed. It also examines the finished work projects and the testing completed by students. Personal reflections of the teachers involved and the other data was triangulated to determine themes, which represent themselves in this study. Because of the nature of a qualitative action research study, our main source of evaluation stems toward the critical components of themes that emerged from the student questionnaire, the teacher questionnaire and the teachers' self evaluation of the project itself.

Student questionnaire

Students were asked to fill out this survey at the end of the unit. They were asked many diverse questions about using the SMART Board interactive whiteboard and technology. The questions and condensed answers are in appendix B. The following is a summary of those responses. Generally, students enjoyed working with technology in the classroom. Results indicate that using the SMART Board interactive whiteboard was more motivating and allowed them to express themselves with greater variety. Students' answers reflected a real comfort and excitement with multimedia. Students felt that having access to this technology gave them the ability to really explore different levels of multimedia. For example, through use of the SMART Board interactive whiteboard they incorporate PowerPoint presentation graphics program presentations, videos, music and educational sites.

A student commented that it helped having a SMART Board interactive whiteboard in the classroom for instant access to technology. Another commented that if we wanted to explore a

topic, we didn't have to wait for our designated weekly computer time. It was also nice to not have to crowd around one small monitor to watch something. Visual representation addressed individual students' differences and ways that they learn. The technology allowed them to retain the information and to create a better mental image than if it was taught traditionally.

With regard to the use of the SMART Board interactive whiteboard, there was greater ease understanding curriculum material because they were better able to manipulate information on the screen. Students felt they contributed more in class because the focus felt like it was not on them as much as it was on the media with which they were interacting. It allowed them to be so much more creative, both individually and in a group setting. Students said they stayed on task better and had the ability to make presentations that were higher in quality because they felt it was so much more effective than using a pen and paper.

Teacher questionnaire

1. How would you define Universal Design for Learning? After going through the study would you define it differently? How or why?
2. How adaptable would this be to your own units? Do you see merit in adopting this design in your own unit?
3. Would you use a unit (designed this way) if you had all the right equipment?
4. What do you see as limitations for the teacher (in preparing) and to the student (in applying it in class)?
5. Does this create work for the classroom teacher or is it structured enough to overlay onto existing unit plans?

Summary

Teachers' interpretation of Universal Design for Learning initially was before reading the unit design varied greatly after reading it. All teachers commented that they did not know what the term meant before reading the material. After reading the material, the general consensus was that they felt it was something that most teachers do in daily practice and planning; they just did not use that terminology. One teacher commented that the term seemed to follow the same principle of "differentiated instruction" or "scaffolding", which are more commonly used terminology in teacher practice.

Teachers showed enthusiasm towards the potential of the SMART Board interactive whiteboard in the classroom to scaffold learning. Each teacher's answer was different due to their comfort level with technology. Those with limited technology experience reported that they would need continued help from a technology teacher. A comment was that this creates a huge amount of work for teachers who have limited ability with computers and a steep learning curve not so much with the actual SMART Board interactive whiteboard, but just being aware of what it can even do and what resources are readily available on the Internet.

Limitations include learning curve, breaking away from traditional (comfortable ways of teaching), fear of technology, amount of time of actual use if it is shared amongst many classroom teachers

Upon review of the completed unit, teachers recognized that use of the SMART Board interactive whiteboard went from teacher-led to student-centered. Some teachers felt this was great as it gave students a greater sense of ownership over there work. One teacher felt this gave to much control to the students and was apprehensive to not have as much control over a final project.

Finished work projects and testing

The largest assessment piece came as a culminating activity at the end of the unit.

The culminating activity of the unit was the students' choice and student-centered. Each student worked on his or her own or with a group. They chose a theme and designed their research project around this. They were given choices of mediums to research and to design their project material and were asked to utilize the SMART Board interactive whiteboard to present projects. This allowed for student creativity and practice with the interactive whiteboard technology. Rubrics for the research project and presentations were given prior to the assignment, enabling students to take ownership of their projects. Projects were very unique. Some groups did skits, some showed pictures and others made pamphlets. PowerPoint presentation graphics program presentations on the SMART Board interactive whiteboard were exciting and fresh. Digital music was incorporated into the presentations along with digital pictures to show their point. Content was related to the unit novel. Each group also played a Jeopardy game using SMART Board

software to test their knowledge about what they learned. This game was very motivating and interactive for the entire class.

Although some pre- and post-testing of students occurred in the Language Arts area, we cannot generalize these results as to the effectiveness of the SMART Board interactive whiteboard used alone as it shows a culmination of months of learning overall of students.

Themes Emerging from Findings

UDL relies on three distinct principles: multiple means of representation, expression and engagement. Based on these principles and our findings, three important themes emerged from this study:

1. The technology provided a teacher-mediated learning environment. The teacher did not take on a traditional role of the source of knowledge but guided students as they defined, developed, altered their learning environment.

2. Awareness of a media-rich environment is critical to classroom technology integration. From personal reflections of teachers, observation of students and student surveys, it became clear to us that educators still rely on traditional methodology in their teaching practices. Incorporating technology into daily instruction is critical to maintaining students' motivation levels. As we engaged with the students in technology and listened to their viewpoints, it raises awareness of how aware and comfortable they and their peers are with many types of technology and their acceptance and desire to use the technology daily.

3. The technology provided high levels of peer interaction and collaboration. As the teachers compared the level of engagement of the student in this unit to student engagement prior to having the SMART Board interactive whiteboard in the classroom, there was a much higher level of engagement. Issues surrounding classroom

management and students' motivation were significantly decreased because of the enthusiasm and desire to use the technology daily.

4. Initial planning is critical to the successful implementation of technology in the classroom. Technology is often taught solely as a separate class in the computer lab. Technology should be as accessible as the classroom set of dictionaries. It should be an underlying theme in all teacher units, as opposed to a separate pull out once a week. It should help you understand better the concepts being learned in the classroom in the curriculum. This relates directly to UDL principles in that it is another means of reaching all students at different levels of learner abilities and styles.

5. The SMART Board interactive whiteboard works well to address the three underlying principles of universal design. It brought a deeper awareness of how educators understand how students learn. Students have many different learning styles and teachers need to address those styles to create situations of better understanding for the students. This then creates greater motivation for the students to remain excited and push themselves and take control of their own learning. Exposing students to many different mediums allows teachers to recognize and explore students' diverse learning needs in the classroom.

Conclusion

Semali (2001) speaks to how educators need to help students comprehend and communicate through both traditional and emerging technologies. From our perspective too, students must learn how to analyze media texts critically, which was why we incorporated this in our unit. There is a considerable gap between what students view at school, that is, largely print based, to what they view outside the classroom, where they are continually faced with digital media and images (Semali, 2001). We incorporated lessons from the Media Awareness Network, a site that offers

teachers many lesson plans to help students understand media awareness. The SMART Board interactive whiteboard was a tremendously valuable resource especially when we started exploring media literacy lessons. Access to online material and viewing material was instantaneous in the classroom. Students were intrigued, and the lessons inspired classroom discussions.

Having the students make meaning out of the constantly changing media in their lives is very relevant and purposeful for students, in order for them to grow and make sound decisions to their ever-changing world.

Applying the principles of Universal Design for Learning forces educators to look closer at individual learning differences in students. It also challenges us to closely examine the nature of curriculum material and find ways to make them more flexible for the diverse learning needs we see on our classrooms today. Embedding goals with flexible materials in place at the outset allows us to provide better support and offers challenge and motivation to the student. For example, instead of having a goal of handwriting a five-page essay, if the goal is to know how to learn what a five-page essay is and how to structure it, simply removing the medium from the goal allows for multiple methods of flexibility in delivery.

Using the principles of Universal Design for Learning in assessment also allows teachers to provide flexible methods of expression, representation and engagement. Although it is necessary to have standardized testing and other forms of traditional assessment, incorporating Universal Design for Learning principles in our more traditional assessment such as unit tests, and formative assessment will provide teachers with insights into how each student learner style and preferences. It also allows teachers to adjust instruction and to evaluate the effectiveness of the methods and materials used.

Using a model like *The Technology Integration Model*, allows teachers a base or starting point in which to plan for technology integration. It is very beneficial to have a structured model showing steps that teachers can refer back to that allows them to ask critical questions about technology implementation. It allows teachers to use technology as an enhancement to the curriculum and the access technology provides to students. A model such as this guides teachers to recognize

when and where technology can be used to make a difference to what they are teaching and the improvements it can make to the way they are teaching. More often than not, the computer lab is viewed as the only place students see any technology and that this room is the ‘fun’ room where students get to play games on the computer.

It is our hope that other teachers in our school view our results and are inspired to learn more about the SMART Board interactive whiteboard and how it can be used in their own classroom. Students in other classrooms have become very intrigued with the SMART Board interactive whiteboard as they see the grade six classroom use it. They ask teachers to show them how to operate it. This has prompted a discussion in the school to create access to the SMART Board interactive whiteboard with other classrooms to allow the rest of the school to use the technology. We continue to explore ways in which to incorporate the SMART Board interactive whiteboard into all academic areas and to help other teachers learn about this technology.

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Appendix A

Unit Design and Structure

Unit Outline – Maniac Magee

1. Introduction – SMART Board interactive whiteboard presentation – Discussion of author, themes, common words that will be found throughout the book – prediction

2. Daily discussion of characteristics of Maniac Magee, Predictions, Truth vs. Legend

3. Literary Circles - A "Literary Circle" is a structure for talking about a book with your peers as you read together. Students are in charge of the discussion and for setting reading assignments together. There are 5 members in each literary circle, and each member rotates one of the following jobs throughout the project.

Roles:

Summarizer - Prepare a brief summary of the day's reading. In some cases, you might ask yourself what details, characters, or events are so important that they would be included on an exam.

Literary Luminary - This student is responsible for choosing parts of the story that he/she wants to read out loud to the group. The idea is to help students remember some interesting, powerful, puzzling, or important sections of the text being read. The Literary Luminary must decide which passages or paragraphs are worth reading aloud, and justify the reason for selecting them.

Travel Tracer - In a book where characters move around a lot and the scenes change frequently, it is important for everyone in your group to know where things are happening and how the setting may have changed. Even if the scenery doesn't change much, the setting is still a very important part of the story. Your job is to track where the action takes place.

Illustrator - This student is responsible for sharing an artistic representation of the material read.

Vocabulary Enricher - This student is responsible for finding especially important vocabulary in the story. Vocabulary selected should focus on words that are unfamiliar, interesting, important, repetitive, funny, puzzling, descriptive, vivid or those used in an unusual way.

4. Stereotypes in media

5. Using poetry (cinquains) to show understanding of stereotypes

6. Analysis of commercials for stereotypes

- Examples of type and Internet commercial, use of the TRAP model

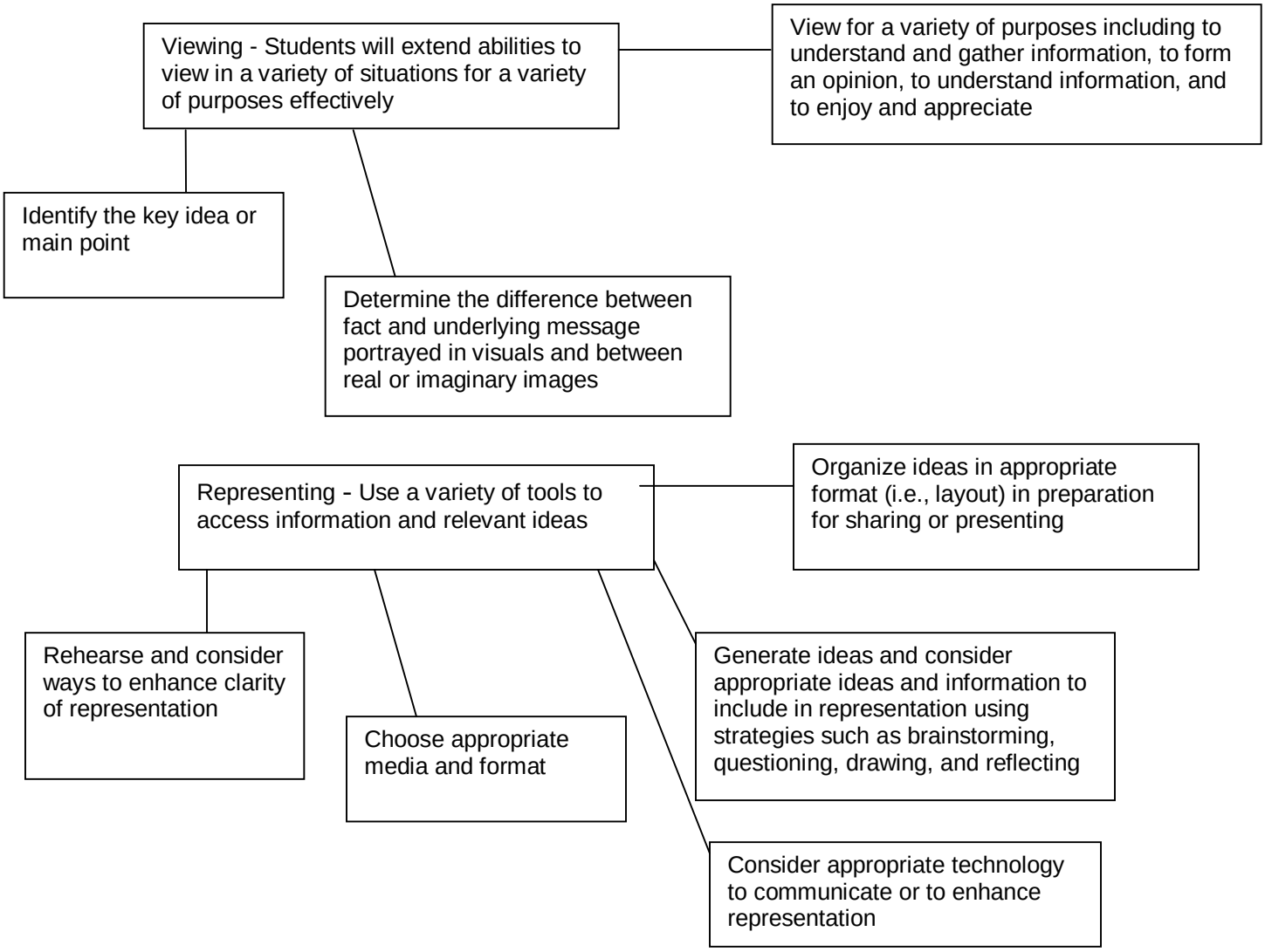
To help students understand more about media literacy, we looked at television commercials, which students are continually viewing. With a variation of the TRAP model (text, representation, audience and production), students were asked to view commercials to allow them to critically analyze messages that are given to consumers.

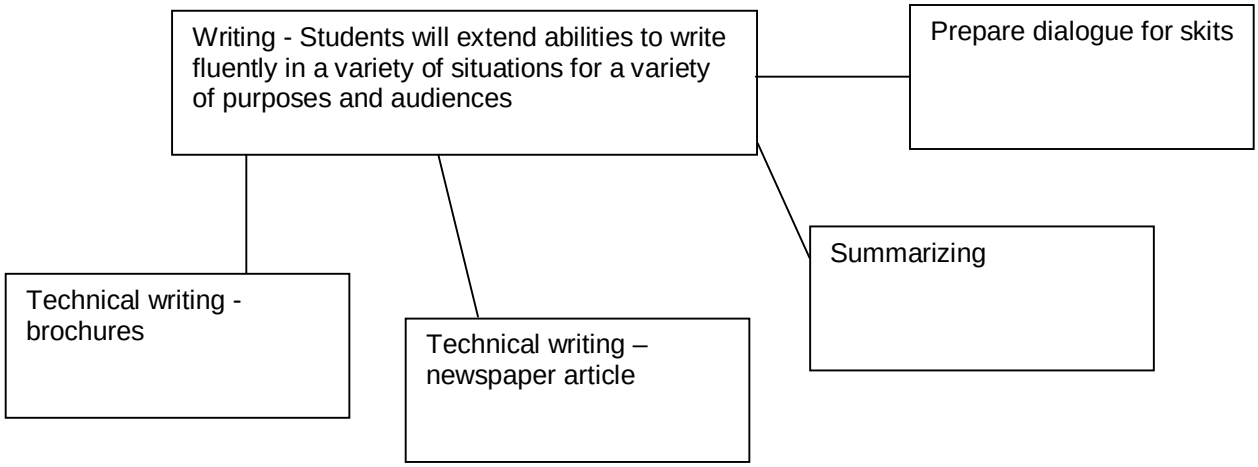
7. SMART Board interactive whiteboard presentations of: prejudice, homelessness, illiteracy, and gangs

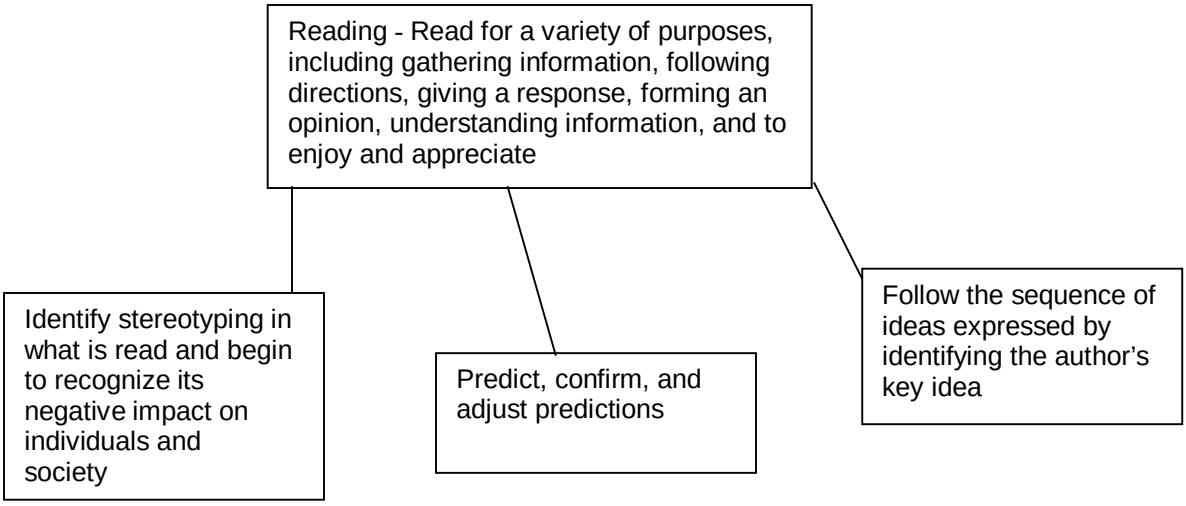
-include alternate type of presentation (eg. skit, brochure, newspaper article, etc.)

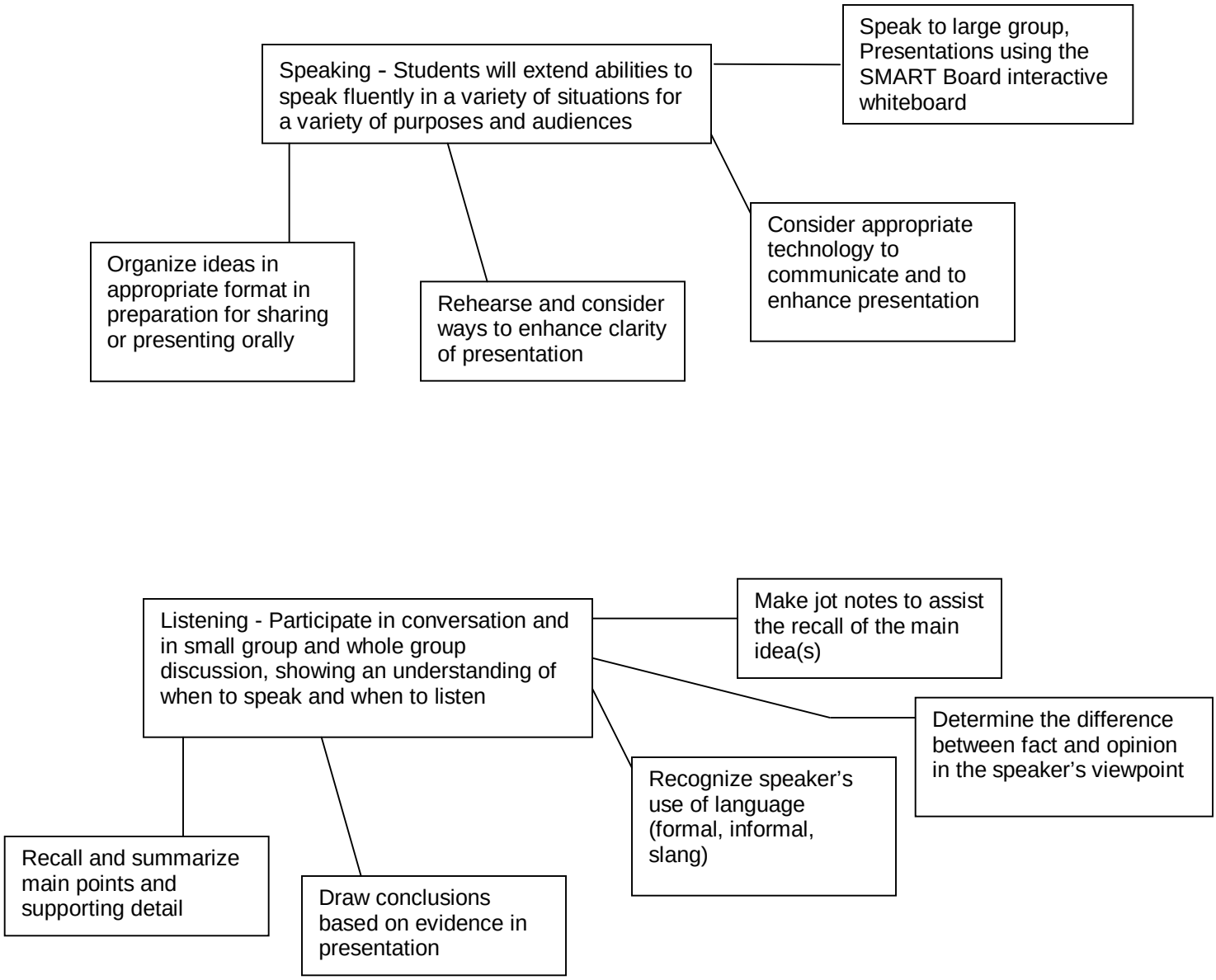
-create game to test kids viewing presentation (Jeopardy)

The following three charts shows ways technology was incorporated into the lesson planning with the six stands of the Saskatchewan English Language Arts Curriculum Grade 6 Objectives




Writing - Students will extend abilities to write fluently in a variety of situations for a variety of purposes and audiences
Prepare dialogue for skits
Summarizing
Technical writing - brochures
Technical writing – newspaper article


Reading - Read for a variety of purposes, including gathering information, following directions, giving a response, forming an opinion, understanding information, and to enjoy and appreciate
Identify stereotyping in what is read and begin to recognize its negative impact on individuals and society
Predict, confirm, and adjust predictions
Follow the sequence of ideas expressed by identifying the author's key idea


Speaking - Students will extend abilities to speak fluently in a variety of situations for a variety of purposes and audiences
Speak to large group, Presentations using the SMART Board interactive whiteboard
Consider appropriate technology to communicate and to enhance presentation
Rehearse and consider ways to enhance clarity of presentation
Organize ideas in appropriate format in preparation for sharing or presenting orally
Listening - Participate in conversation and in small group and whole group discussion, showing an understanding of when to speak and when to listen
Make jot notes to assist the recall of the main idea(s)
Determine the difference between fact and opinion in the speaker's viewpoint
Recognize speaker's use of language (formal, informal, slang)
Draw conclusions based on evidence in presentation
Recall and summarize main points and supporting detail

Appendix B

Student Questionnaire

1. What things were you able to do on the SMART Board interactive whiteboard to make learning more interesting?
Comments:
-make slideshow; use Internet; draw pictures; use SMART Board software; play educational games; watch video clips; ability to move or change things; write; school subjects; drag things;

2. Did being able to manipulate objects on the screen help me understand what I was learning better?
Strongly Agree: 20% Agree: 60% Uncertain: 15% Disagree: 5% Strongly Disagree: 0
Comments:
-I had a better understanding of it; it's easier to do the work because you don't have to erase everything on the page; because I didn't understand what to do if you were talking; it made more sense; it was easier than rewriting it again; I could do things my own way

3. Using the SMART Board interactive whiteboard helped me express my thoughts better?
Strongly Agree: 5% Agree: 55% Uncertain: 35% Disagree: 5% Strongly Disagree: 0
Comments:
-it's easier because I can draw on the board and use other colors than saying it; I could put my thoughts into action; I could express it better because people could see it and hear it not only hear it; it was more visual; I could draw out the way I thought of something; it helped me express my thoughts better because you could see and move objects freely; I could express my own thoughts in many ways

4. Did I participate more in class when we used computers; the SMART Board interactive whiteboard and other technologies?
Strongly Agree: 30% Agree: 45% Uncertain: 10% Disagree: 15% Strongly Disagree: 0
Comments:
-I like computers; for me it's just easier than reading or writing on paper; it was more fun and easy; I don't participate in class much; it's faster than writing; because it's something new and we all want to learn new things about it

5. Visual representation on the SMART Board interactive whiteboard made it easier to understand and remember information?
Strongly Agree: 30% Agree: 45% Uncertain: 10% Disagree: 10% Strongly Disagree: 5%
Comments:
-it is easier for me to see things than say it; I have a good memory so no; because I as a person can learn more visually than listening; I could visualize a picture if I forgot what a word meant; I think it's easier from notes; because you don't have to imagine things you can see the things happen; because I almost have a photographic memory; it's easier to remember than on the whiteboard; it gave more techniques to remember; because it was fun and more interesting so I listened and paid more attention and stored information

6. Viewing media on the SMART Board interactive whiteboard helped me understand the topic better?
Strongly Agree: 10% Agree: 50% Uncertain: 30% Disagree: 5% Strongly Disagree: 5%
Comments:
-it's just like reading or hearing it isn't any better; it helped me in many ways; it had pictures and examples and mini-exercises that were fun to do; you can view slide shows and presentations

7. Did you feel comfortable using the new technology?
Strongly Agree: 40% Agree: 40% Uncertain: 10% Disagree: 10% Strongly Disagree: 0
Comments:
-I love new technology; I did and I didn't because I didn't feel right/comfortable in front of people and did because it was fun; at first it was a little hard to get used to but I got it eventually and am now very comfortable using it; you had to show your work in front of the class; it was really awesome and more exciting to learn on a SMART Board interactive whiteboard; it felt like I used it before; kind of I was worried about not knowing how to use it or screwing up

8. What ways did you find the SMART Board interactive whiteboard motivating to your own learning?
Comments:
-I had more chances to learn and use a new type of technology; I felt it was motivating because I didn't have to read as much; it helped me mostly in math, it makes me focus more; visually learning listening more and enjoying school more; it was more fun easy and understandable; you could play games like chess and Jeopardy; it's funnier, I enjoy working more; doing our presentations on it was really great and allowed us to do more; it was more fun because of the touch screen; answering math questions; I paid more attention

9. Was it more motivating when we used the SMART Board interactive whiteboard in a lesson?
Strongly Agree: 35% Agree: 55% Uncertain: 5% Disagree: 5% Strongly Disagree: 0
Comments:
- it was fun and fast; it was more fun and easy to understand because of pictures used in it; it was easy to understand and we didn't have to write much; it's more fun and makes you want to work more; when we did lessons we were able to use it

10. Did I have trouble manipulating the SMART Board interactive whiteboard?
Strongly Agree: Agree: 5% Uncertain: 10% Disagree: 85% Strongly Disagree: 0
Comments:
- it was easy after the third or fourth time; out teacher explained to us what to do so well and the SMART Board interactive whiteboard was just easy to use; the touch sensors were to sensitive

11. Was the SMART Board interactive whiteboard was a useful tool during group work?
Strongly Agree: 45% Agree: 35% Uncertain: 10% Disagree: 10% Strongly Disagree: 0
Comments:
-we worked together more and had more fun; it was easier finding jobs for everyone; we could do slide shows

12. Did I give better class presentations when I used the resources from the website and the SMART Board interactive whiteboard?
Strongly Agree: 30% Agree: 50% Uncertain: 15% Disagree: 0 Strongly Disagree: 5%
Comments:
-because it is usually harder than imagining one thing than seeing it; I knew where everything was and how to use it; we could make things like presentations to make it more interesting; it made it easier with pictures and other things; its easier than having to say everything; yes it helped instead of people crowding around one computer to see it; you can go to websites quicker

13. Did our group produce a higher quality product through the use of the SMART Board interactive whiteboard versus traditional methods?
Strongly Agree: 30% Agree: 55% Uncertain: 10% Disagree: 0 Strongly Disagree: 5%
Comments:
- it's easier to get information and put it on a presentation; we all learned from each other

- because we didn't get to use it in reports or major assignments except in presenting; because it was done by computer not pen and paper; we could use videos pictures or other ways to show our information without having to use other things like televisions we also didn't have to find real life props

14. This unit allowed me to be more creative?
Strongly Agree: 25% Agree: 50% Uncertain: 20% Disagree: 0 Strongly Disagree: 5%
Comments:

15. With technology I was able to stay on task better?
Strongly Agree: 20% Agree: 55% Uncertain: 15% Disagree: 5% Strongly Disagree: 5%
Comments:
- it looked interesting and I wanted to listen; there were more things to do and none of the jobs were boring; because I liked it I wanted to do it again; because we are not reading all the time; there are really cool things to stay attached to when using the SMART Board interactive whiteboard; because it is so amazing to see you want to keep on looking and reading it

16. Generally I like learning with technology?
Strongly Agree: 35% Agree: 55% Uncertain: 5% Disagree: 0 Strongly Disagree: 5%
Comments:

Additional Comments
- it was a surprise to me to get the SMART Board interactive whiteboard it improved our school work and more fun! Using the SMART Board interactive whiteboard has been fun it now feels like just a completely regular thing as if I've been using one since I began school it would be strange not to use it anymore