Smart Technologies
In a Technology Classroom:
Integration Investigation of Smart Board & Smart Notebook into a 7-12 Technology Education Classroom

A Master's Project Presented to

Information Design and Technology Program

In Partial Fulfillment of the Requirements for the

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Abstract

The project explores how the different uses of Smart technologies (Smart Board and Smart Notebook) can aide in teaching technology education and address New York State and ITEEA (International Technology and Engineering Educators Association) Standards for Technical Literacy during instruction by the creation of three Smart Notebook documents to be used in a 9-12 grade technology education classroom of 8-14 students.

The lengths of the three presentations vary from 10-40 minutes. One presentation is used as a teacher presentation (and student note-taking) tool and demonstrates some of the affordances that Smart Notebook has over using a traditional whiteboard and markers or Microsoft Office Power Point. The second presentation explores interactivity and demonstrates how the interactive whiteboard can be used to increase student participation and motivation in the through the use of games, activities, and interactive websites. Lastly, Smart Notebook is utilized as an assessment tool; allowing the teacher to create questions from multiple resources.

The project also covers a review of literature that attempts to explain why Smart Technologies have become so popular and are often credited to improve student learning. The literature review covers a few basic theories of student learning and informational technology and design that explain how content should best be created and structured so it is learner-friendly and effective.

Certificate of Approval

SUNY Institute of Technology

Information Design and Technology

Approved and recommended for acceptance as a project in partial fulfillment of the requirements for the degree of Master of Science in Information Design and Technology

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Introduction

> "In the United States, there is a growing movement that involves the development of educational programs that center around science, technology, engineering, and mathematics (STEM)" (Duggar, 2008 p. 3).

Interactive technologies such as Smart Board and Smart Notebook have shown success when integrated into math and science classrooms. The writer/researcher is a 7-12 grade technology education teacher with no Smart Board training and interested in applying the technology in his own classroom. The teacher has six classes to prepare: Introduction to Technology (7 and 8 grade), Transportation Systems, Design and Drawing for Production, Woodworking, and Manufacturing. Each course takes a lot of time to plan and develop and the technology and teaching resources at the school are limited.

Currently, the teacher attempts to occasionally incorporate computer technology in the classroom through the use of a school-wide shared laptop cart and shared computer lab. Student time with these technologies is limited because they are shared amongst the entire school. There is only one computer with a DVD/VCR, Elmo (digital camera), and projector in the classroom.

The teacher still relies heavily on printed source media for teaching and finds it difficult to motivate students to read and write using paper sources, as students do not find it interesting. Furthermore, administrators have not been supportive of using traditional printed text. A high school principal at the school stated that "no one uses text books anymore and that teachers should just use online resources." Digital media appears to be the way world culture is heading.

It is the goal of the teacher to investigate Smart technologies and how they can be implemented to better teach technology education. The teacher learns how to make Smart presentations and develops three examples; 10-40 minutes in length. The first is utilized as a presentation tool to explain and demonstrate new learning to the students. The second serves as a review activity and explores the

interactivity of Smart Board. Lastly, the teacher employs Smart technology as a means to evaluate learners. Some of the key questions the teacher had prior to completing the project were:

- What are Smart Technologies?
- Do Smart technologies improve student engagement, motivation, and overall performance levels? If so, how and why?
- What is meant by interactivity?
- What can Smart Board do? What are its capabilities? What can it bring or add to the classroom? How does it compare with other programs currently being used?
- How do other teachers use Smart technology? How does one learn how to use it?
- How should Smart technologies be used in the classroom?
- Can it help at addressing the learning standards? If so, how?

Literature Review

Technology Education Defined

> "Most Americans (68% in 2004, 67% in 2001) view technology narrowly as being computers, electronics, and the Internet. This was the result of an open-ended question that was provided to the respondents in which they had to verbally tell the interviewer what they thought technology was" (Duggar, 2008 p. 1).

New York State Education Department accepts the ITEEA (International Technology and Engineering Educators Association) definitions of technology, technology education, and educational technology. Technology is described as either "human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities" or "the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants" (EdTech, 2010). Educational technology is concerning the use of "multimedia technologies or audiovisual aids as a tool to enhance the teaching and learning process" (EdTech, 2010). Technology education on the other hand is the "study of technology, which provides an opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extend human capabilities" (EdTech, 2010). Therefore Smart technologies are educational technologies that can help teachers address technology education standards to the learners.

New York State Math, Science, and Technology Standard 5 states that "Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs" (EdTech, 2010). Technology Education programs are designed to use "concepts of science, mathematics, social science, and language arts in a hands-on, systems-based approach to problem solving that guides students in the understanding, design and development of systems, devices and products to serve human needs and wants" (EdTech, 2010).

The goal in education should be to produce what is known as "technically literate" students. Technological literacy is defined as "one's ability to use, manage, evaluate, and understand technology" (Duggar, 2008 p. 3). Technology literate students should be able to comprehend underlying concepts involving computers and computer applications. Students should demonstrate proper ethics and safe use of technology for the use of communicating, research, and problem-solving. "A characteristic of a technologically literate person is that they are comfortable with and objective about the use of technology neither scared of it nor infatuated with it" (Duggar, 2008 p. 3). New York State requires that K-8 teachers integrate technology into instruction and that high school's offer a at least one credit of technology application and/or career type courses for graduation (EdTech, 2010).

What is a Smart Classroom?

A "smart classroom" is sometimes referred to a classroom that has the latest technologies. That used to be one that had a computer with internet access, DVD player, VCR, document camera, and a projector (Wong, 2008). Before that, it may have been a simple overhead projector. Today, a "smart classroom" usually refers to whether or not a classroom is equipped with an interactive whiteboard (Smart Board) and Smart computer software (Smart Notebook) designed by Smart.

Smart began making interactive whiteboards in 1991. Since then, they have been integrating profusely into classrooms world-wide. According to Future Source

Consulting, Smart accounts for nearly 50% of all interactive whiteboards globally, and closer to 63% in the United States. There are in 1.6 million classrooms world-wide using Smart Boards. Smart claims that there are 175 countries that have downloaded Smart software, and there are over 5 million Smart Notebook 10 users (Smart Technologies). Several models and sizes of Smart Boards are available to choose from, and with various versions and updates of software programs, there seems to be a fit for everyone.

Smart Board sells itself as an interactive whiteboard, allowing the user to access the computer screen by touching the white board. Presenters no longer have to be seated at the computer screen, as the Smart Board allows presenters to remain front and center of their audience. This also means that audience viewers can get up and come to the front and actively participate in the presentation by manipulating images and text; changing the role of a viewer as a passive listener to an active participant (Mott, 2010).

"Interactivity is understood as one of the key 'value added' characteristics of new media. Where 'old' media offer passive consumption new media offer interactivity" (Lister, 2003 p. 20). The Smart Board has an added value over older technologies by offering new mediums of interactivity that a standalone projector or dry erase whiteboard cannot do.

The Smart Board can be touched with a finger, or interactive pen. The interactive pens can be used to write digital text on the screen, which can be easily be saved or erased in seconds. This makes note taking and highlighting of information simple. The screen can be captured as a still photograph or recorded as a video for replay. This media can then be uploaded and downloaded using other media technologies and accessed outside the classroom. "When students are involved in using out-of-school literacies that use digital media, they are more engaged in the learning process" (Mott, 2010).

The Smart Notebook allows for easy capture (copy and paste) and moving of text and images into a presentation. Although Microsoft Power Point can also do this, Notebook

is efficient and easy to use and has more teaching tools that can be brought into the presentation page that make it more usable by math and science teachers.

> "The main distinction between IWB (interactive whiteboards) authoring software and other presentation software is that the IWB software contains tools allowing you to easily program interactivity. Students then can literally get out of their seats, approach the IWB at the front of the room and click and drag items on the board and/or click items that play audio, video or other types of files" (Mott, 2010).

Drawing tools such as a ruler, compass, and protractor along with the ability to use the pens to draw lines make it easy to create demonstrations for math classes. Graphs and charts can be uploaded into the presentation with a click of a mouse or a touch on the Smart Board which is also highly practical in a math or science classroom setting.

The hide screen, shade screen, zooming, and magic pen features in Smart Notebook also make it easy to highlight or hide content. This helps focus students on the content you want their attention and minimizes distractions in the presentation (Kindopp).

Student Curiosity and Affects on Learning

Syracuse University School of Information Studies conducted a research investigating curiosity and the role it plays in student learning; directly affecting motivation, engagement, and interest. The study suggests researchers to find new ways to study and develop curiosity through the use of information technologies.

> "if parents and educators do not recognize the role of curiosity in both informal and formal learning environments, how will they know when curiosity has the potential to enhance a learning experience versus when it may actually distract from learning" (Arnone, 2011 p. 184)?

Arnone states that not enough current research exists on the role curiosity plays on learning. There is a history of research that was done in the 1950's up through years until the 1980's, but this research is much before the large implementation of computer technologies in classrooms. Studies from Berlyne, Beswick, Tallmadge, White, Deci, and Piaget are all post dated 1970s or later. The only studies 1980 or newer mentioned

by Arnone are from Reio et al, Litman and Jimerson, Tapscott, Palfrey and Gasser. These newer studies investigate the structure of curiosity deeper; attempting to identify causes. Alessi (2001), mentions motivational studies done by Leeper and Malone in the 1980's and makes a distinction between sensory and cognitive curiosity. "Sensory curiosity is aroused by visual or auditory effects that are surprising or attractive attention. Cognitive curiosity is aroused by information that conflicts with the learner's existing knowledge or expectation, is contradictory, or is in some way incomplete. These situations encourage the learner to seek new information that remedies the conflict" (Alessi, 2001 p. 25).

Arnone proposes a different definition of curiosity as "a desire for new information or experience afforded by new media environments and includes a trigger or multi-trigger scenario evoked by dynamic media environments" (p. 185).

According to Arnone, the desire initiates a reaction and a resolution (satisfied or non-satisfied). If the learner is satisfied, new learning will usually take place; further increasing student interest. Arnone argues that curiosity is affected by personal, situational, and contextual factors. Examples of personal factors are a learners own motivation, competence, developmental differences, and cognitive abilities. Situational factors refer to the "in the moment" factors which influence curiosity such as personality, predispositions, emotions, etc. Contextual factors are the "setting" factors such as a classroom, or online learning environment which would influence the curiosity (Arnone, 2011).

Why Study Student Behavioral Traits?

There are many reasons why an educator would want to invoke curiosity in a classroom. Students that become curious develop an interest in the learning material. Once student interest is captured students are more likely to be involved and fully engaged; further helping to establish a learning environment with less behavior problems (Arnone, 2011) which in turn reduce distractions.

Studies have suggested that varying between curiosity questions and the phases of interest can lead to better student engagement and deeper levels of learning (Arnone, 2011). As an educator, one of the goals we are taught is to strive to make students progress to higher levels of thinking and apply that knowledge to create and evaluate content. The goal is to increase student engagement and continually challenge them.

Engagement can occur in three forms: participative, affective, and cognitive. A participative engagement example would caused be an imposed goal (by a parent or
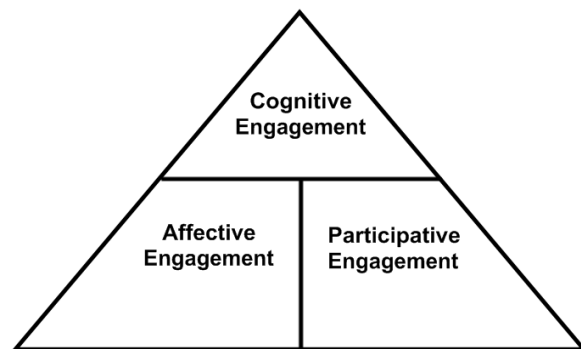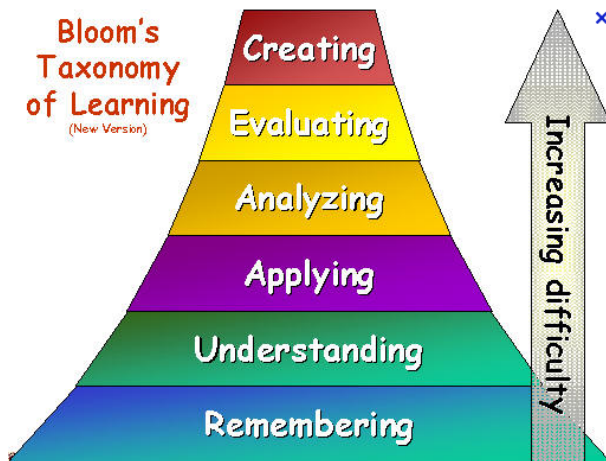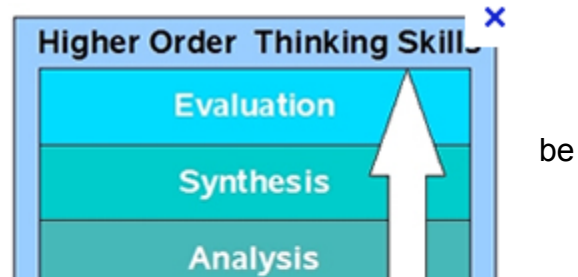
teacher) but have little impact on a student's interest to learn. For example, if a student is told that he/she cannot attend a school function unless a certain grade is meant, the student would participate, but only to attend the school function. It may not mean that the student is interested in the content. An affective engagement occurs because the learner finds the learning to be enjoyable and fulfilling. Activities and games are an attempt to make learning more fun for students and an example of affective engagement. A cognitive engagement occurs when the learner is intrinsically interested and committed to learning the content (Arnone, 2011). This would be the highest level of engagement, and helps us identify the meaning of student interest.

Arnone agrues that in order to understand the impacts that technologies have on student learning, we must first better understand the role and meaning of curiosity and engagement. Only then can we accurately evaluate the effects technology has on learning. Arnone states that "once curiosity is ignited and interest is piqued, certain technologies may help students focus their curiosity inspired learning through goal setting and planning" (p.191).

Smart Technologies and Student Learning

> "Used effectively, technology can play a role in stimulating curiosity and interest and in facilitating and sustaining purposeful engagement. More ever, technology can play a role in triggering and addressing personal, situational, and contextual factors that support autonomy and competence and enhance active, deep learning" (Armone, 2011 p. 182).

Smart technologies are being used because they are said to "enhance learning" by increasing student "interest" through "active engagement" (Smart Technologies). Theoretically, we should be able to see how Smart Board affects all three forms engagement (affective, participative, and cognitive) since student interest does not fully develop until at the highest level of engagement according to Arnone's model. Since Smart Board claims to increase student engagement, there is the possibility that it even increases student interests through the affective and participative domain.

A common finding is that Smart technologies motivate students to learn through active participation and engagement. Motivation is hard to measure but is categorized as either being intrinsic or extrinsic according to Malone's Motivation Theory (Alessi, 2001, p. 26). Extrinsic motivation can help explain the reasons for affective and participative engagement. There is usually some external source (reward) that encourages the learner to participate. Extrinsic motivational tactics are said to be the least affective because the rewards become the focal point of the learner's interests rather than the learning content. (Alessi, 2001, p. 26). However, they may be the best way to get students engaged that normally wouldn't be.

In contrast, intrinsic motivation is highly effective and described as rewards that "come from within the person" (Alessi & Trollip, 2001, p. 25). This is the cognitive engagement that occurs when the learner has developed self-interest in the learning content and therefore finds gratification investigating the content deeper. There are four primary elements that further motivate intrinsic learners: challenge, curiosity, control and fantasy (Alessi & Trollip, 2001, p. 25). "The more a program includes these four elements, the more successful learning is because people enjoy it more" (Alessi & Trollip, 2001, p. 25).

Smart technology is said to be "interactive," but what defines interactivity? Dictionary.com defines interactivity as the state of allowing continuous two-way transfer of information. Research shows that students' best learn when interacting with others and when technology further promotes those interactions (Wong, 2008). It also suggests that students learn the fastest through direct instruction from the teacher (Ruutmann, 2011). Therefore, the role of the teacher cannot be replaced by the technology, but if the technology allows for better transformation of information, we can argue that learning should still improve. However, Arnome (2010) states that information technology "can also overwhelm and distract by providing more information than can be organized and processed to determine relevance." This is also known as information overload.

Smart technologies claim that they help enable students and teachers by saving time organizing information visually through the manipulation features. The technology also helps "create meaning, making connections, and develop understanding" (Smart Technologies). Giles (2011) also claims that Smart technologies "helps bridge the difference between learning styles, abilities, prior knowledge, and interest levels that exist within any group of children." Part of this may be explained by the fact that students view the latest technologies relevant. "Students see the use of relevancy-based digital tools, content and resources as a key to driving learning productivity" (Arnone, 2011 p. 193).

Investing in Smart Technologies

Should educators invest in these technologies because they are relevant to the learners? "Nowadays, just chalk and board are not enough to attract attention of the students who are intensely exposed to external stimulus like television and computer" (Ertan, 2011 p. 25). It is becoming increasing difficult for educators to teach even old concepts without current technologies because students' do not see the relevance and therefore lose interest. "Several theories of learning assert that technological tools have an influence, which words cannot achieve alone, on directing individuals, focusing their attention, and their capability to analyze and synthesize" (Ertan, 2011 p. 26). Therefore, an argument could be made that using outdated technologies does indeed decrease the moral, motivation, interest, and ability for students to learn.

> "The early days of instructional computing were filled with excitement and prophecies for the potential of great educational improvement through computer-base instruction. However, although there have been great strides in technology and availability, actual improvement in learning is less dramatic" (Alessi, 2001 p. 4).

Most of the research on Smart technologies are in favor of it, but most of these studies are based on either student or teacher viewpoints. There is less research found that effectively measure the affects the technology has on learning with solid data to back these statements up (Ertan, 2011).The most common method of measuring student interest found was through student survey. These surveys rarely came back negative, and largely favor Smart technology. Although Alessi (2001) claims the opposite for computer technologies:

> "Hundreds of research studies have been conducted to prove that using computers to teach is better than using books, teachers, films, or other more traditional methods. Overall, reviews of these studies claim a small effect in favor of computer-based instruction" (Alessi, 2001 p. 5).

Theories, Philosophies, and Recommended Design Techniques

> "Student behavior has been perplexing and disruptive in formal educational settings where traditional ways of delivering instruction and

engaging students may collide with learning preferences and proclivities of the digital student. Students who have 'grown up digital' or have been 'born digital' exhibit behaviors which challenge us to reconsider personal, situational, and contextual factors in light of a technology-pervasive world" (Armone, 2011 p. 182).

The rapid emergent of information technologies has cultivated a large scale of design theories, and recommendations as to how to best develop and use these new technologies. A need for specialized training on how to utilize emerging technologies is always increasing in demand. Ertan (2011), says that these technologies allows for more rapid teaching, overloading students. Educators can too feel overloaded with the pressure of keeping up with these rapid changing technologies. Designing and developing any educational software is time consuming and difficult" (Alessi, 2001 p. 40). Never the less, educators are expected to keep up with changing trends, and learn the new way to teach even if it's the same old material.

"The outcomes of education and training must include more than just learner achievement. They must include learner satisfaction, self-worth, creativity, and social value" (Alessi, 2001 p. 37). If students do not take pleasure in learning, they are less likely to obtain higher level achievement. It is therefore essential that educational systems upgrade and invest in modern technologies that will better promote student curiosity, interests, motivation, and participation alike.

 "In tomorrow's world, people must be adaptive and lifelong learners, must have the confidence necessary to change with their environment, and must be able to work collaboratively with others" (p. 37). It is difficult for learners to watch on the sidelines and stay positive as other learners get to use new emerging technologies to do the same tasks. The newness of these technologies is what keeps learners interest through continuing curiosity. The challenge of change is another element that promotes learners to be motivated. Shifting with these technologies gives its users the assurance they need to efficiently work and collaborate as they view the changes as pertinent.

Designing New Media Technologies

Alessi (2001), created a model for developing interactive multimedia that list three attributes (standards, ongoing evaluation, and project management) and three phases (planning, design, and development). The standards should always be the starting point and the foundation in education (Alessi, 2001 p. 409) and "it is not practical nor effective to wait until a project is nearing completion before assessing whether the standards have been applied" (Alessi, 2001 p. 410). Therefore ongoing evaluations must take place. Immediate assessment and feedback are an important element for increasing student success at achieving the standards.

The theory of multiple intelligences emphasizes that individuals have different intelligence levels and that everyone learns with different reasons, in different ways and at different speeds (Ertan, 2011). One of the many arguments for learning how to use Smart technologies is that it helps address teaching diverse students. It fosters the all learning styles by allowing people to learn not only by observing and listening, but by doing (Alessi, 2001, p. 24). This helps the visual, auditory, reading/writing/ and the kinesthetic learners.

Bonk and Zhang (2006) recommend the R2D2 teaching method (Reading/Listening; Reflecting/Writing; Displaying; and Doing) all of which can be incorporated into Smart presentations. Bonk and Zhang further point out that the use of "interactivity, visualization, collaboration, captivation, and technology sophistication motivate learners and promote effective learning" (p. 251). To make learning effective, Bonk and Zhang suggest breaking learning down into four phases. First, get students involved with real experiences. Second, have students reflect on their experiences using active listening and observation skills. Mott (2010) also recommends organizing collaborative groups to discuss their experiences and understandings. Third, create ideas and finally make decisions through active experiments. Mott (2010) states that learners should have a sense of empowerment through creating their own presentations and have opportunity to become the 'sage on stage.'

Another common suggestion is that teachers should give lots of examples and should use visual stimulus such as graphics, charts, and pictures along with text to help students learn (Ertan, 2011, Mott, 2010). This is very helpful with the visual learners, but Smart takes viewing a step farther by allowing learners to touch the material which also helps the kinesthetic learners.

We understand that students learn through many different ways (seeing, hearing, reflecting, collaborating, simulating, reasoning, visualizing, etc). It is expected that our teaching methods should also vary with lecture, demonstrations, discussion, and application (Ruutmann, 2011). "A successful teacher or successful designer of instructional materials must adapt to the needs of different learners, subject areas, and situations" (Alessi, 2001 p. 40). Too often "teacher education programs do not adequately prepare teachers to infuse technology into their classrooms upon graduation" (Mott, 2010). It is the role of educators to enhance learning through these new technologies that help promote active learning, collaboration, and problem solving skills (Mott, 2010).

> "Teaching has only one purpose, and that is to facilitate learning. Learning can occur without teaching at any loss to anyone, but teaching can, and unfortunately often does occur without learning. In the latter case, the students obviously lose time, money, potential gains in knowledge and cognitive development, and perhaps confidence in themselves and in the educational system" (Ruutman, 2011).

Project Design

Description of the Project:

The project consists of the design of three separate lessons using Smart Notebook software. Smart Notebook can be used in conjunction with Smart Board to make interactive presentations that are said to increase learner curiosity, interest, motivation, participation, and performance. The Smart Notebook software can also be used from the computer to assist teachers in making presentations, activities, and evaluations even if a Smart Board is not available. The three types of lesson formats demonstrated will be a general presentation, interactive review game activity, and a type of assessment.

As a Presentation Software:

The first lesson set uses Smart Notebook as a presentation tool. Most users are familiar with Microsoft Power Point as it is the predominant presentation software. However, using Smart Notebook for the same presentations has some additional affordances. The 'screen shade' allows the teacher more control of what to show or hide on the projector screen. The split screen permits the user to show two slides simultaneously, which gives some students additional time to complete note taking, while others that are ready can move on. The 'full screen' and 'transparent screen' options allow additional control over the viewing of the presentation. When the user selects 'transparent screen' the notebook page takes up the entire computer screen background and allows all of the Smart Notebook tools to be used. This allows the user to write notes, and import or copy and paste images on the presentation slides. This means that the instructor can change or modify presentations as they go.

The recording option is an additional affordance that gives the instructor the option of capturing the entire lesson so that it can be saved and distributed digitally. This is great

for distant learning programs or credits offered online. In addition, it allows teachers to post notes (pdf files, or video files) to websites for students that are absent from class. This makes catching students up simple for both the teacher and the student.

There are special drawing tools that are available that help increase user activity. There is a ruler, protractor, and compass that are highly used in mathematic courses. With these tools, a user can draw objects at set distances and angles showing geometric relations, or scaled mock ups of items the instructor may be trying to explain. Various line and shape options give the user even more methods of drawing items. A selection of pen and highlighting tool choices can be selected. Each of the pen tools vary in color, width, and/or pattern. A special 'magic pen' allows the user to write notes that disappear automatically over an eight second period. The same pen can be used to control zoom functions by drawing a square or rectangle around items. If you draw a circle around an item it shades everything but that item. This centers the attention of the students on the area you want to emphasize.

The 'screen capture' camera allows the user to take snap shots of the computer screen. Smart's build in screen capture tool is much easier to use than a standard computers 'print screen' command. Smart's screen capture tool allows the user to select only sections of the screen. A computer's 'print screen' command only prints the entire screen, so a user would then need to crop the picture in another program such as Microsoft Paint to modify it. Smart's capture tool eliminates all of that additional hassle. This tool makes capturing images or text as easy as a copy and paste command, but gives the user better control over the material. The copy and paste command can still be used and suggested if altering text is required.

As an Interactive Review Game:

Certainly the software program gives the user (teacher) many additional affordances that other presentation software does not. However, how can that be used to benefit the learner? All of the affordances listed in the presentation can also be applied to increase

student interactivity. Review games can be created in Smart Notebook that helps stimulate student interest and participation by making learning fun. Although a Smart Board is what makes the games interactive, Smart Notebook is the software program that the game is created in.

A review game titled "The Answer is Right" (a spin off the famous Price is Right game show) was created using Smart Notebook. The review game features 14 games from the game show for students to play. Teachers can implant as many questions as they want, but 50 are needed without a lot of modifications or eliminating some of the games.

Plinko- Students answer questions to earn a Plinko chip to drop.

Cliff Hangers- Students answer questions to move the Mountain man up the scale earning more points (the man yodels the theme song).

Punch A Bunch- Students answer questions to tap the Smart Board to win a hidden prizes.

Secret X- Students answer questions to earn an "x" to try to get tic tac toe. There are three spots with secret prizes.

Clock Game- Students answer questions as quickly as possible as a clock counts up or down. Each correct answer doubles the points.

Gas Money- Students answer questions to earn points. They can choose to take their points or continue risking it all to win the biggest prize.

Let Em Roll- Students answer questions to earn a roll of the dice in a Yahtzee like game.

Dice Game- Students answer questions to earn a roll of the dice from the single digits to the thousands place digit.

Bullseye- Students answer questions to win a chance to throw the koosh ball at the dart board.

Rat Race- Students answer questions to click on their mouse who races to the finish line with every click.

Hole In One- Students answer questions to earn a swing at Mini Putt Three.

Card Game- Students Play Texas Hold Em Poker. Each question answered correct earns them a fold. Otherwise they have to gamble their money. The student must survive five hands. They can lose it all or earn more points!

The game demonstrates the "link" command by linking the Smart Notebook pages together throughout the document though the touch of images. The first Notebook page acts as a "homepage" for the game. It displays the team scores, and the games available to play. A student (from each team) is asked "come on down" as a contestant. They are given a question that they must answer correctly to continue playing and earn their team's points. The first person to answer the question correctly (as in Jeopardy) will continue to play on. The other pages feature separate games that the students play to earn points by giving the correct answers to other review questions. When the game is complete and the points are rewarded, the screen returns to the "homepage" to update team point totals and start over with another contest.

The game demonstrates how the use of the Smart technology can be used to increase student interest, motivation, and participation through activity; all of which help lead to an increase in student performance. It does this by allowing students to actively participate by getting up out of their seat to answer questions by interacting with the Smart Board. The game helps stimulate learning by creating competition and making the learning fun.

Other features that the game exemplifies are various animations, sounds, and image locking. Each image brought into the Smart Notebook document can be animated.

Sound clips can also be imported and started automatically or by click (or touch). Images can be set to a locked position so that they cannot be moved or changed. This is especially important for designing templates that should not be modified.

As an Assessment:

Typing various forms of assessments (worksheets, quizzes, tests, etc.) from scratch can become time consuming. In the past I have used Microsoft Word as my main software tool to create assessment documents. I often find myself spending too much time fighting with the auto correct feature on MS Word as the program seems to think it is smarter than me. I also spend a great deal of time modifying images only to be disappointed to find out that I cannot get it to look like I want. With Smart Notebook, you can type text and modify it the same as you would in MS Word. You can also import images (either using the screen capture, or copy and paste method) and move them easily in Smart Notebook. Once you have the text and images where you want them on the page you can lock them in place. There are layers you can control, so images or text can be sent to back or brought to front to overlap each other.

One teacher I spoke with was using Smart Notebook primarily for this reason. He would quickly make worksheets or tests using the screen capture tool to select regents review questions he found online, or had scanned in. Because the screen capture feature allowed him to select questions from online sources at will, he was able to make various documents to print in a matter of minutes.

If the teacher does not want to print the pages as a hard copy document, the questions could be reviewed in class on the Smart Board, allowing each student to come to the board. This is often how homework reviewed in class. A Smart Board allows the teacher (or student) to write their answers on the board (without the smell or mess of markers). More importantly, the Smart Response system could be utilized, which is a remote or each student so that each student can answer independently and the results are given immediately to the teacher.

I created two documents to be used by the teacher as an assessment tool. A homework worksheet and test created in Smart Notebook gave me two additional forms of assessing student learning progress.

Learning Theories Exhibited:

The project's purpose was not to prove or test any particular theory, nor to evaluate the technology; however the technology and several learning theories can be further explained by studying the two simultaneously. One of the main reasons for using Smart technologies in the classroom is that it is said to increase student motivation, leading to better student learning. That was the reason I took interest in this project. While designing the project I kept several theories in mind.

Arnone's Curiosity Theory model describes how personal, situational, and contextual factors affect a learner's curiosity. The model further demonstrates how curiosity develops into student interest, which leads into increased learner engagement. Three types of engagement are broken down: cognitive, affective, and participative. Engagement is a critical key that can lead the learner into deeper levels of learning as stated in the Blooms Taxonomy model.

Malone's Motivational Theory identified four factors influencing motivation: challenge, curiosity, control, and fantasy. Keller's ARCS Motivation Theory suggests four design criteria's to increase motivation: attention, relevance, confidence, confidence, and satisfaction (Alessi, 2001). Designing Smart lesson presentations with these theories in mind could prove either the theories or success of the technology.

Ertan's Theory of Multiple Intelligences explains how learners learn in various ways (audio, visual, textural, and kinesthetic) at various speeds. Since Smart seemed to be so universal and dynamic, it provides teachers methods to address multiple learning styles and abilities combined in the same classroom.

The lessons were developed with the *R2D2* (Reading/Listening; Reflecting/Writing; Displaying; and Doing) *Learning model* in mind as the presentation method. The general approach by the instructor is to present information to the learners and allow the learners to read it for themselves. This was the reasoning for developing the presentation using Smart Notebook. Next, the learners participate in a reflective exercise. Smart Board allows this step to be done the same time as the first by allowing students to write on the board. The completion of the review exercise (The Answer is Right game) is one of the methods for the participation exercise. The final evaluation displays whether or not the student has learned the content or need further teaching.

Information Design Theories applied:

Several information design theories influenced the creation of the lessons. Mike Cooley's Human Centered Design characteristics of coherence, inclusiveness, malleability, engagement, ownership, responsiveness, purpose, panoramic, and transcendence where carefully considered when designing each lesson (Jacobson, 2000). Below is a description of how each relates to the development of the review game.

Coherence- Each page links back to the first page by an image. The image (The Answer is Right icon) is the same on every page. This is a good example of demonstrating coherence which reduces any confusion as to how to get back to the main page.

Inclusiveness- The first page is the image of the teams and the games. Each game icon is linked to the game page, inviting the user to play. Students should have a feeling of inclusion from being a member of a team as well as being a part of the crowd during the games.

Malleability- The game was made so that any teacher could put in questions of any subject area for review. The game can be adapted for any classroom.

Engagement- The games invite the students to play and become involved. Even students that are not selected to be the contestant can be encouraged to shout out the answer like the crowd does on the show.

Ownership- Since there is multiple games students can choose the game of their choice, creating a feeling of ownership.

Responsiveness- All games require touching of the Smart Board. Students develop a sense that the game is responding to their input when they manipulate it.

Purpose- The games purpose is to provide a fun way for educators to review content to learners. It encourages the learners to participate.

Panoramic- Many games have a point system which double. Therefore teachers should pick questions that become increasingly more difficult for these games. Furthermore, questions can encourage deeper more divergent thinking.

Transcendence- Each game has more questions than needed to win the biggest prize. This encourages students to continue answering the questions to reach the biggest reward even when one is answered incorrectly.

What makes any new information technology attractive and successful is its simplicity and interactivity. To be interactive it has to give the user "choice, control, or incitement to be productive or creative" (Jacobson, 2000 p 283). This was one of the goals while developing the review game. Students are given choices as to which games to play, and control through the use of the Smart Board. The scores are to be kept by each team by writing them on the main page, further giving the students control and encouraging productivity.

Anticipated Findings

It is expected that there will be an initial learning curve that must be overcome in order to fully understand how to use the technology. One reason I have been reluctant using the technology is that it takes time to learn it. Time is precious as teacher, especially when designing specific content for six different classes which limits any free time to learn new technologies.

Furthermore, it will be difficult learning the technology and become accustom to it because there is not a Smart Board in the classroom. Smart Notebook is installed on the classroom computer, and an educational trial version has been installed on a home laptop. This will help with access to Smart Notebook, but not to the Smart Board. In order to access a Smart Board I must use one from another classroom. When giving the presentation to the class, the computer and mouse will still need to be used or the class will have to be taken to the computer lab where a Smart Board exists. This is another reason why it currently is not being used in the classroom. Access is simply limited, and makes using it more of a chore than a convenience.

Based upon my own understanding and the information gathered from other teachers and article summaries, I would expect students to show a little more interest and be slightly more motivated to learn. It will be different for the students, since they do not normally receive lessons on Smart Board in my classroom. Students will likely be engaged at a typical (normal) level and faintly show more engagement and pleasure when interacting with the technology. I do not necessarily believe that Smart technology will improve student learning, however that will not be assessed. It would be difficult to measure significant impacts that the technology has on individual students as well as the class as a whole. I do not expect to see any noteworthy differences in how student behave towards the material. I suspect that three presentations will be too short of a period to witness any changes in the students, but additional time would have impacts.

Unless a Smart Board is installed in the classroom I don't anticipate using Smart Board in future settings. Although the initial nervousness of using the technology may be settled, I do not expect to have any additional curiosity or interest in using the technology after developing the project presentations.

I foresee students as not being additionally motivated or interested in the content based on the technology medium that it is taught through. I believe that the teacher is the key to inspiring learners and that the teacher is what makes a difference; not the technology.

Findings

General Findings:

I noticed that more students recently spoke up as to why I did not have a Smart Board in my classroom. Students seemed to think that because I was a technology teacher I should have the newest technologies in my classroom. Since bringing up the topic and the mention of this project with them, the students more frequently point out how and when I could use a Smart Board in my classroom based on their experiences with other teachers who have them. This has made me want one more.

When presenting in the computer lab with a Smart Board I found students to laughed at the fact I did not know how to use it. The students had more experience with it than I did from other classes. This lack of experience I felt made me look as though I was less credible as a teacher. The students not only look to use current technology, but to the instructors who should be confident and capable of using it. My lack of experience showed and those illiteracies distracted the students from best learning the content, which made me wonder if I was better off not using it at all.

Hitting the Standards

Although more trials would have to be done, I did not see the use of a Smart Board or Smart Notebook to significantly increase student performance, motivation, or engagement. The game did produce some excellent participation and excitement when played, however most activities alike usually do. Students are generally more motivated with during a competition type activity where some sort of external reward is placed (even if it is not a tangible reward). Therefore it is not known whether or not the use of the Smart technologies actually increased the students' motivation. It did work well producing a lot of interactivity within the classroom. There was a lot of dialog between students and the teacher, as well as through the technology.

Smart technologies such as Smart Board and Smart Notebook can help at addressing learning standards because it is another tool or medium that information is passed through. It can help educators teach content by providing a way of presenting more visuals. It also gives students more opportunities to engage by actively participating and manipulating content rather than being restricted to being an observer only. This is evident when students approach the Smart Board to answer questions. Because of its popularity and relativity students may also respond better to instruction when Smart Technologies are used correctly.

In the project examples, the presentation gave the instructor an additional means to introduce content (such as tree species) to the students using visuals. This makes it much easier for student to correctly identify live tree species when walking outside. This would be an example of how using Smart Notebook as a presentation medium could increase student performance. The review game is an example of how the use of these technologies can influence student motivation. Smart Notebook can be used to create assessments as a means to record student progress. The Smart Response system is also an option to record that data.

The Presentation

The development of the presentation material was easy and straight forward. Smart camera capture tool made importing images from webpage's easy. The hardest thing was to find and sort through the material on the internet.

I chose to make a presentation on tree species for my Wood Technology class. At the beginning of the year students are taught how to identify between various species of trees and how to distinguish types of lumber by the grain pattern. In the process, the students usually learn some other history about the various trees such as what else they are used for. The presentation uses a lot of images to help the visual learner. It does not fully utilize the audio and interactive features in this example. The students did not respond much differently when presented in this format as it was shown using a traditional projector.

To improve the overall presentation experience, Smart Notebook presentations are best taught using a Smart Board. This allows the teacher to remain at the front of the classroom, and to right notes as they go (manipulating the content). Even the presentation material can and should be made to be interactive. At the end of the presentation, a matching quiz was set up to allow for a student to come forward and use the Smart Board.

The time that it takes to put together a presentation is equivalent to other presentation programs like Power Point or Prezzi, and they can be saved and reused which saves time and effort when compared with writing it on a dry erase board every time.

Since I don't currently have a Smart Board, I don't plan to continue to use Smart Notebook for my presentation software. It is primarily the Smart Board which makes the content interactive. Smart Notebook is just one medium through the Smart Board. One of the best uses for Smart Notebook is to do math problems on the Smart Board. It reduces the need for dry erase markers and makes it much easier to repeat teaching the material for additional classes.

The Interactive Review Game

The Answer is Right was made as a template for any classroom teacher to use as a review game with their class. It is available through Smart Exchange. All a teacher needs to do is implant their questions and answers. The rewards (currently point system) can also be modified. Teachers can choose any reward they want for each of the games. Examples of other rewards may be winning a homework pass, extra points on a test, or tangible items.

The game demonstrates the use of extrinsic motivational tactics as a method of developing a student's participative and affective motivation areas. It is intended to make the learning fun and exciting for the learners to encourage further curiosity and thought.

There were many challenges I had while developing the game. The biggest was finding flash files to use within the game. Smart does not have a very big library of flash files (.swf) and therefore I had to search for them on the internet and on other web pages. I had to teach myself how to save flash files from other websites. This all took time which may discourage other teachers from using the program to its full potential. Smart should make a better gallery of flash files to make them more accessible for its users.

Once the game was produced, the content had to be put into it for the review game. I had trouble coming up with enough questions from one unit for the entire game. The game requires about 50 questions minimum, so it is better for a larger review such as for a midterm or final. However, teachers could choose to play only one of the sub-games for their review.

The use of Assessments

When one of the teachers showed me how he primarily used Smart Notebook to make test questions, I thought it looked like a great way to asses students. However, once I

started using Smart Notebook to make a set of questions to quiz students, I found out that it was more difficult to modify the material than anticipated.

Test questions can easily be captured from any source on the computer using the Smart Capture Camera. The problem is modifying it afterwards. If text is of different font and size there is no way to change it as long as it was captured as an image. To get around this I still used the highlighting (copy and paste) method. Then I was able to modify the text. This was not much different than the way I was doing it using Microsoft Word.

When I used the camera to capture text as an image, I attempted to modify it using the Smart pen. There were test questions that I wanted to change, so the pen was used as a white out marker. I then wrote over the white space using the text box. This worked well as long as I did not try to move the material. I learned that if I decided to move the text (which was necessary to align the questions) the areas in which I used the pen to white-out were affected. This little detail frustrated me and made me turn back to Microsoft Word.

Smart Notebook can be used to create test, quizzes, worksheets, or other types of student evaluations. It is easier to work with images because they are more manipulative and have less restrictions than in Microsoft Word. Sometime it is a challenge to set up MS Word so that the text and images align the way you want them too if the user has limited experience using the program. Smart Notebook was quick and easy to learn and allowed for good image alteration.

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