



TECHNOLOGY
RESEARCH
COMMITTEE

2006 – 2007 Grant Project Report

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Look SMART! Final Report
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Areas For Student Use

The Smart board was introduced to the classroom in mid September 2006. At first, it was introduced as a way to enhance our note taking skills. According to Kiewra and Benton (1984), the "amount of note taking is related to academic achievement" and the "ability to hold and manipulate propositional knowledge in working memory is related to the number of words, complex propositions, and main ideas recorded in notes" (p. 33). Each student took a turn during class writing on the Smart Board. As we completed chapter outlines, students would tell the person writing on the board how to fill in the blanks on the outline. Originally, this was just a chance to allow students access to the technology and I did not want to encourage this process for note taking, since it is nothing more than a glorified overhead projector. However, student response to the use of the board for this strategy was surprising and positive. One student commented that by writing on the board, it validated his contribution to the process of taking notes (each student finds the information from the text to complete the next line in the skeleton outline). Another student said he was more conscious of his contribution since it would appear right away for all to see. Another student said she thought it was more of a team approach to completing the outline, since she could see another person completing the notes as she did. The process was enhanced using the Smart Board technology and the completed notes were posted daily on the Blackboard page for student reference.

The second function of the Smart board was to help students generate graphic organizers for review and for taking notes from a lecture. At the end of each chapter, students, in groups of three, used white boards to create a concept map of the terms from the chapter. Groups volunteered to put their concept map on the SMART board for the class to see, and the process was recorded, with verbal explanations of connections preserved. These recordings were placed on the Blackboard page so students could review the main ideas of the lesson. The actual graphic created was printed and copied, and students used these for the next class period. During the following class, students watched a video on the topic. One student added notes to the graphic organizer on the smart board while others suggested what to add and added their own notes to their copies. The purpose of this activity is to help students create outlines from textbook readings and add to them during lecture; a strategy they can use in college courses. Outside of class, students had the graphics available for review and could revisit the process with the models recorded.

The primary function of the SMART Board was to record student created tutorials to be used for reinforcement and review. After students were introduced to a quantitative concept, we would examine model problems as a class. Then students, in groups of two, used white boards and generated a series of steps needed to solve a sample problem. Volunteers demonstrated their procedures to the class and these were recorded on the SMART Board. These "student-created tutorials" were saved on the Blackboard site so students had access to model problem-solving strategies for remediation, reinforcement and review. The act of creating the tutorial had significant instructional benefits for the students. Each

member of the class was required to articulate his understanding of the concept and problem-solving strategy, while another student peer-assessed. This process created an environment where students felt safe to work together and take risks, while giving and receiving immediate feedback. The prospect of preparing a presentation for a real audience, i.e., putting it on the SMART Board, motivated students to use the time allotted to perfect their procedures (very little class time was wasted; students were seldom off-task when given a practice problem).

Difficulties encountered when using the SMART Board

Three areas of concern have emerged when trying to integrate the SMART Board technology into my curriculum. First, there is a time issue; it took a large portion of class time in the beginning of the year just introducing the students to the Symposium and allowing them to practice using it. This time was not wasted, but invested. Each and every student was allowed to use the Symposium and encouraged to become comfortable using it. The time spent introducing students did decrease the amount of time available for the traditional teaching activities, but it was worthwhile when all students took ownership for the technology and all students were willing to participate in recording their procedures and graphic organizers.

A second difficulty that emerged was the saving of the graphics and tutorials on the Black Board page. These short clips add up and there is not enough space to save them on my Black Board site. I put most of the clips on the school's web page, but neglected to tell the Webmaster. She discovered items popping up on the web page thought it was a student hacking in and deleted them as they appeared. (I never thought to check to see if they were there once we moved on to the next chapter, so there are very few of the original tutorials and graphics left.) Next year I will label and organize them for each chapter and spend time with students in the computer room showing them how to access the tutorials for review and reinforcement. I also plan to show the teachers involved with students that have IEP's how to access the course materials so they can help my students find what they need.

The third problem involved the technology itself. Presentations Concepts hooked up a set of buttons and a connection box to the table where the Symposium is used. These connections attach the laptop and Symposium to the data projector. The connections were never reliable; they did not turn on or off or switch from one input to another. Meanwhile, I had to leave my room at the mercy of a teacher who does not respect other's equipment, so each day I needed to disconnect my laptop and SMART board and remove them from the classroom. Setting up the equipment each morning became an arduous affair; sometimes it worked, sometimes it did not, and most days I invested forty minutes before I either had success or realized I could not use it. The morning class is comprised of students who need the most academic support and those students would have benefited the most from the technology, but I usually could not use the SMART Board with them because I needed more time to trouble-shoot. As it turned out, I did have wires connected correctly, but the connection to the data projector box was shorting out the laptops. We went through three laptops this year, two before it became obvious where the trouble was. Since

April I have not been able to use the technology. Presentations Concepts says it is not the fault of the wiring and will not come look at the connections.

Adjustments to the original intent and additions for use as a learning tool

When applying for the grant, I thought I would be the one who recorded lessons for absent students. Recording the entire forty-minute lesson takes up too much space, and these videos cannot be saved on my Black Board page. Instead of recording what the teacher does, it is much more beneficial to record what the students do. Involving students in the acquisition of concepts, the procedures for solving problems and connecting the ideas while providing them with a real audience for presenting their thoughts adds a dimension that removes passivity. Students have become engaged in active learning and self-assessment. The time provided to students to develop procedures and graphic organizers cemented relationships in their minds. Research supporting the activities is included in the outline used for the Telecom 5 Conference (Fig 2).

Student Responses

Quantitative data could not be collected this year for the number of times students accessed the site, since the tutorials and graphics I thought were being added were erased biweekly. The other study of the affective domain and the change in students' perceptions regarding Chemistry and the use of technology also could not be completed. Since we have not been able to use the equipment since before April vacation, it seems that as we finally became comfortable with the SMART Board, it broke and we could not use it. I have included the comments I received from when we first started using the SMART Board for taking notes (Fig3).

When asking the students how they feel about using the SMART Board, they were generally positive, however, the last month of using the equipment was spent trouble-shooting problems, and many students were frustrated by its lack of reliability. The weakest students, who would benefit most from the added visuals, were the ones who lost the most time since that class met in the morning and I often did not have enough time to figure out the problems before we met. Overall, students are very positive with regard to the activities we used to integrate the technology, and Deb Dalton, librarian, made a pod cast when interviewing three of my students (attached to the electronic version of this report).

Suggestions from students

Students have been removed from using the SMART board for almost two months, so reflections and suggestions for future use are limited. However, one suggestion made early on in the year was to incorporate the highlighting feature for reviewing the lesson at the end of each class period. The use of color seems to benefit many students, and we adopted a highlighting technique at the end of each period. During this time we review and highlight important ideas and connect sections of the notes using different color highlighters. It seems the color helps more than the highlighting; several students started color-coding different sections of their notes to aid when reviewing for quizzes. The color suggestion demonstrates that the use of the technology is not an end in itself; it is a process of developing effective learning strategies each student can adopt.

Discoveries

Many observations were made that I had not anticipated. The first is the way the use of the SMART Board improved the classroom environment. Since all the students began using the technology at the introductory level, they developed a strong sense of camaraderie, universally students supported and helped each other and were willing to take risks and give and receive feedback. The preliminary activities, where students worked in groups preparing either a graphic or a problem solving strategy, were times when all students remained on task. The SMART Board gave the students a vehicle where they could perfect a presentation to give to a real audience, and it motivated them to do a good job whether they were working with white boards or with the equipment. It was more than motivation, however, it was a sense of teamwork that developed with everyone learning the same thing at the same time.

The second discovery involves the reaction of other teachers in the school to the use of the SMART Board. Ertmer (2005) refers to studies by Schunk, and states that observing what others are doing is a powerful motivational tool for teachers, and it builds their confidence to try these techniques. Many teachers in the high school have already started or plan to start integrating technology into their classroom routines. Through the efforts of Bonnie Nobiling, by seeing what I am trying to do with my classes and by hearing the students talk about the SMART Board, teachers are becoming aware of the ideas that they can improve their teaching using technology. The best part is that my efforts are so clumsy they are replicatable; no one is intimidated by the technology after witnessing the trouble I have learning to use it.

Plans to Improve use of the Technology

Several strategies will be changed before using the technology during the 2007-2008 school year:

1. I have told the Webmaster to expect additions to the science page for the next year.
2. I plan to instruct students and parents in how to access the resources on the Blackboard page early in the school year, through direct instruction and by demonstrating during Open House in October.
3. I plan to meet with staff members who support students with IEP's before school begins to show them where the resources will be located so they can help those who need the extra review and reinforcement find the tutorials.
4. I am working with the other Chemistry teacher who has adopted the tablet pc and SMARTboard technology and is beginning to replace lecture-focused lessons with activities for students. We will be developing lessons for each topic that use Internet resources, text enhanced graphics, student created tutorials and graphic organizers and note taking strategies.
5. The other Chemistry teacher and I will also be creating calculator-based lab activities that use the laptop and probes for recording, sharing and analyzing data. These activities are a result of our becoming more

comfortable using technology and recognizing the importance of instructing our students in technology and science literacy.

Presentation

Originally I planned to use a power point presentation that showed the data collected in order to share my results. Instead, the presentation format I used for the Telecom 5 Conference stressed the role of the student in technology integration; my students showed how we use the SMART Board. The plan is attached (Fig 4). I am also attaching one of the first video clips created with sound and the smart board (attached to electronic version).

Final Thoughts

Integration of technology is meaningless unless it is used to improve learning. I discovered this year that the Sympodium and tablet pc are powerful tools that students can use to make their learning pretty, but the real learning occurs when preparing the presentations. I also recognized early on that by working together to use the SMART Board, I was able to see strengths in individuals that would not be visible in a traditional Chemistry class. I also had a chance to get to know my students in a more relaxed environment. Technology added to all facets of my teaching, and I am grateful for the equipment and opportunity to use it with my students.

References

- Ertmer, P. "Teacher pedagogical beliefs: The final frontier in our quest for technology integration?" *ETR & D*, 53, 2005, pp.25-39.
- Kiewra, Kenneth A., and Benton, Stephen L. "The relationship between information-processing ability and notetaking," *Contemporary Educational Psychology*, 13, 1988, pp. 33-44.

Fig 1 Acid-Base Graphic Organizer: Students created this graphic from the terms in the chapter, adding to it during class. I used Inspiration to change from their handwritten one to this. SMART Board has concept map software, but we don't know how to use it yet.

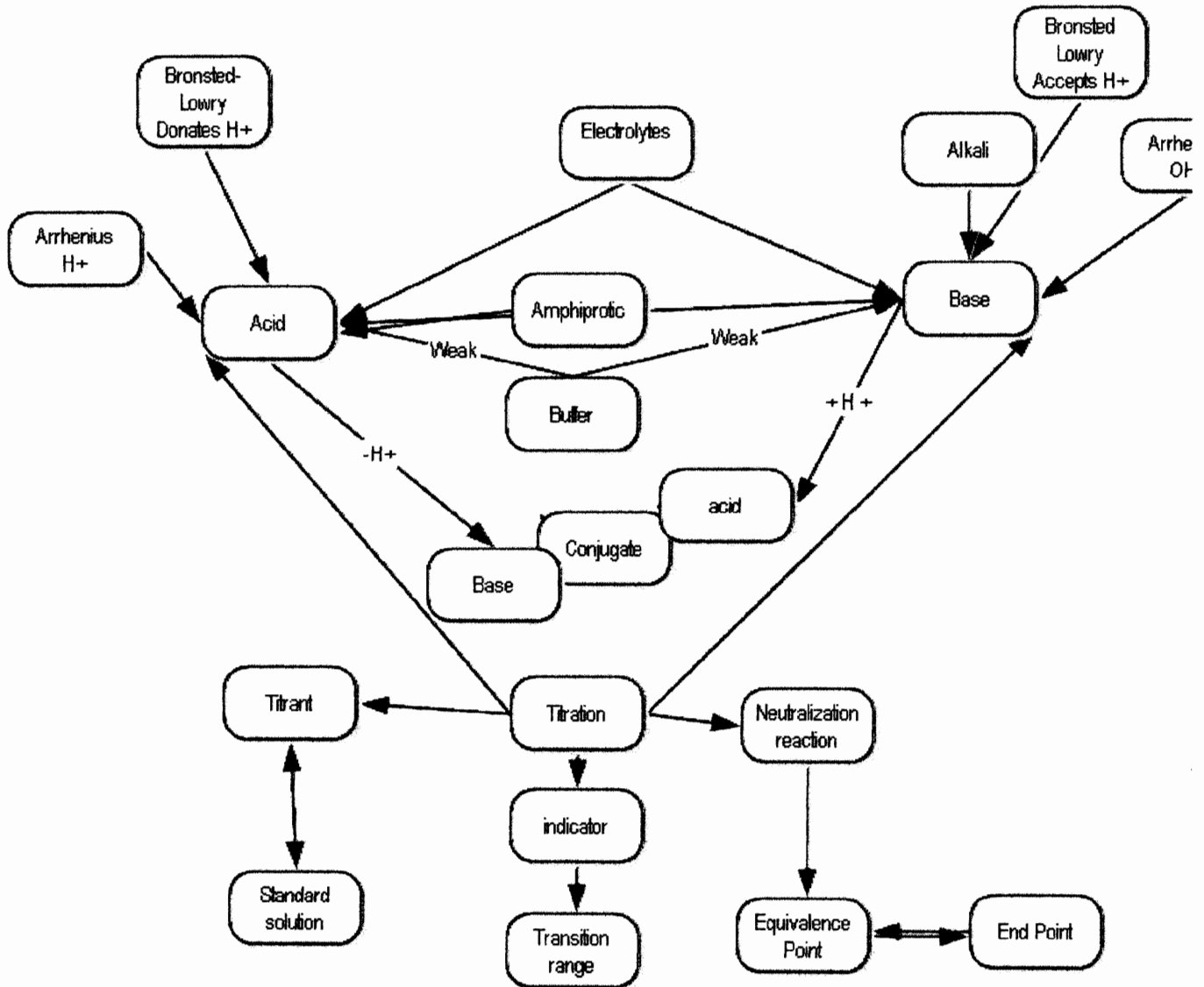


Fig 2: Outline for conference (Research-based support for learning strategies)
SMART Chemistry

How we use the SMART board in high school Chemistry class

Presented by: Eileen Robbins erobbins@oneontacsd.org
Brad Fink, Monica Jones,
Jenna Konstantine, Zane Relethford

Theory supporting the use of the SMART Board:

Some of the key messages about the brain that our learning and teaching practices need to account for are its:

- interconnected logical, creative and intuitive powers of thinking
- need to connect new learning with what it already knows
- preference for its own individual modes of learning and for physical activity
- dependence on a balance between relaxation and energy
- demand for powerful multi sensory stimuli and the unique and significant in experience
- need for frequent opportunities for reflection and review to ensure recall and long term learning to take root
- conscious and unconscious levels of activity and its preference for diversity and variety in perspective when assimilating new experience
- requirement that lasting learning is associated with positive emotions and feelings
- need for a social setting and collaboration - effective learning is constructed by the learner through interaction
- sense making search for connections, associations, patterns, models, systems, schemata within which to "frame" new learning

The brain looks for incentives to learn and some of the fundamental incentives include:

- the process is enjoyable
- an interest in the subject
- relevance and meaningfulness of the experience
- the intrinsic worth of the task
- the recognition of developing competence and achievement
- generalisability to other areas of experience (ISD Development, 2000).

Uses for the SMART Board:

Note Taking and Concept Maps

Note taking has a positive impact on the linguistic mode of learning, since it involves the learners in the subject matter that is transpiring in class, it causes us

to reflect on the subject and then record our thoughts, it helps us in interpreting the subject matter, and it provides an additional linguistic reinforcer. You can help them with the note taking by providing rough outlines and fill-in-the-blanks. But do not just rely on one method. For example, fill-in-the-blanks can also be concept or semantic maps (mapping) – you provide the lines and circles, while the learners fill them in. (ISD Development, 2000).

Concept mapping can be done for several purposes:

- to generate ideas (brain storming, etc.);
- to design a complex structure (long texts, hypermedia, large web sites, etc.);
- to communicate complex ideas;
- to aid learning by explicitly integrating new and old knowledge;
- to assess understanding or diagnose misunderstanding.

The concept mapping technique was developed by Prof. Joseph D. Novak at Cornell University in the 1960s. This work was based on the theories of David Ausubel, who stressed the importance of prior knowledge in being able to learn about new concepts. Novak concluded that *"Meaningful learning involves the assimilation of new concepts and propositions into existing cognitive structures"*. (Lanzing, 1997).

Practice Problems and Models: Demonstrate and record steps in problem-solving, model note taking from lecture.

Review and Reinforcement: Save student created tutorials for others to use on the BlackBoard Page.

References:

- Clark, D.(2003). TriM Learning Theories. Retrieved 5/1/07 from <http://www.nwlink.com/~donclark/hrd/learning/theories.html>.
- ISD Development (2000). *Mind friendly learning*. Retrieved 5/1/07 from <http://www.school-portal.co.uk/GroupHOMepage.asp?GroupID=91541>.
- Lanzing, J (1997). The Concept Mapping homepage. Retrieved 5/1/07 from http://users.edte.utwente.nl/lanzing/cm_home.htm.

Fig 3: Responses from students in the beginning of the school year.
Sept 22, 2006

What you like/don't like about SMART Board and Bboard

If I'm sick I can see what we did in class and what the homework is and how to do it.

SMART Board is a bit fussy right now trying to figure out how it works

It helps me be organized

Don't feel comfortable with it yet; where to look for tools

SMART Board can be distracting; I like to see what the other students are writing

I like that the SMART Board is interactive, user-friendly and we get to use it. I don't like that I can't write neatly on it.

I like SMART Board because you can catch what you miss in the notes and the highlighting helps see what's on the quiz.

I like that when it's my turn to use the SMART Board, I really have to concentrate on what we're talking about so I can take notes better.

I don't like that not every teacher uses Bboard and SMART Board should be in every room.

I like that it's there to look at later if I need to see it again or just to review

Using this technology makes Chemistry seem more scientific

Getting used to SMART Board and Bboard takes time and I just want to use it then move on.

I like writing on the magic glass

I could not get our daily notes off Bboard.

What I don't like about Bboard is that it is difficult to find any information about anything except Chemistry

I don't like SMART Board because we can't each have our own.

I like that I can see the exact same things we did in class that day and I can show my parents what I did.

Interaction with other students' writing on the SMART Board makes the class more interesting; you can see what other people do.

I like that you can put up diagrams and shapes, but I don't like that it does not recognize my handwriting even when I print neatly

I like that we are all learning to use the SMART Board and Bboard together so I don't feel like an idiot when I can't do something on it. It's like we are working as a team.

Fig 4: The Plan for Telecom 5 Conference

1. Introductions and background
2. Mrs. Robbins talks about note taking
3. Zane and Monica show how we take notes
4. Jenna and Monica show how we highlight notes for review
5. Mrs. Robbins talks about graphic organizers
6. Jenna and Brad show how they construct graphic organizer
7. Mrs. Robbins talks about taking notes from lecture
8. Brad and Jenna show how we add to our graphic from video
9. Mrs. Robbins talks about solving problems
10. Monica balances an equation
11. Zane does a practice problem
12. Question and answer