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Weblogs and Wikis in the Classroom

by Teresa Coffman, Ph.D.

Although weblogs have been in existence since the mid 1990s, many teachers are still trying to decide whether to use this tool in the classroom, and if so what is the most effective means to integrate this technology. Wikis have been in existence for the same amount of time and are just as mysterious. Even as this article is being read, these tools continue to be explored by many educators for the very first time! Studies are being done in a variety of contexts to ascertain how these tools can effectively be utilized for internal communication and collaborative tools for project completion. One of our roles as teachers and administrators is to provide students with the skills necessary to compete in the 21st century. To do this, we need to be aware of and introduce our students to the technological tools presently being used. But first, we need to determine whether these tools will be effective in our classrooms.

As an assistant professor of education, I teach instructional technology courses in a graduate teacher education program. The effectiveness of these technology tools is exactly what my students, consisting predominately of pre-service and practicing teachers, are currently struggling with. As different technology tools are developed, how can we determine if they will enhance our classrooms and be effective learning tools for our students? Over the past academic year, students in my classes explored weblogs and wikis to determine their effectiveness for use in the classroom as a teaching and learning tool. Of interest was whether Vygotsky's educational theory of social interaction and knowledge construction could be enhanced by these social communication tools (Vygotsky, 1978). This article presents a historical perspective of the past academic year where students in my classes defined, practiced, and developed strategies for using weblogs and wikis effectively in the K-12 classroom and academic environment.

Weblogs (or blogs)

A "blog" is a frequently updated web page with content shown in chronological order with the most recent posting first. Weblog postings frequently incorporate web URLs or hyperlinks to outside resources. Blogging is the act of writing one's thoughts into a blog and hence they are often referred to as online personal journals (WikiPedia, 2005a).

Blogs can include just about any type of imaginable content. They can be personal accounts or academic and topic based. Weblogs usually revolve around a topic or idea of the author(s). While they can include hyperlinks and images, no knowledge of hypertext markup language (HTML) is required. Thus, blogs can be created quickly and easily. This is a very enticing feature

Weblogs & Wikis, continued

because creating web pages can be time consuming. Teachers function under numerous time constraints and therefore need teaching and learning tools that are effective and aid in student achievement, but do not take a lot of time and effort to figure out. Blogs are tools that teachers and students can set up and use quickly and easily in just a few simple steps (Winer, 2003). In my classes, students first developed a definition of blogging based on the available research and literature and then studied blogging to understand its purpose. They searched for blogging software to determine how easily this tool could be used in the classroom setting. Several free blogging software tools are available on the Internet that teachers can use. In my classes, blogger.com was the software chosen for our purposes of exploration.

In our search, we also found blogging software designed specifically for school-age children called KidzLog. There is a free trial period to test KidzLog to ensure it will meet the user's needs. It is easy to use, allows images created by students to be uploaded onto web pages, and is affordable. The software is loaded onto the school's server and, if adopted, must be purchased. The benefit of loading blogging software onto a school's server is that it gives the school more security options. This may be an important component to consider when teachers and schools begin to plan for student web publishing.

Blogs in education

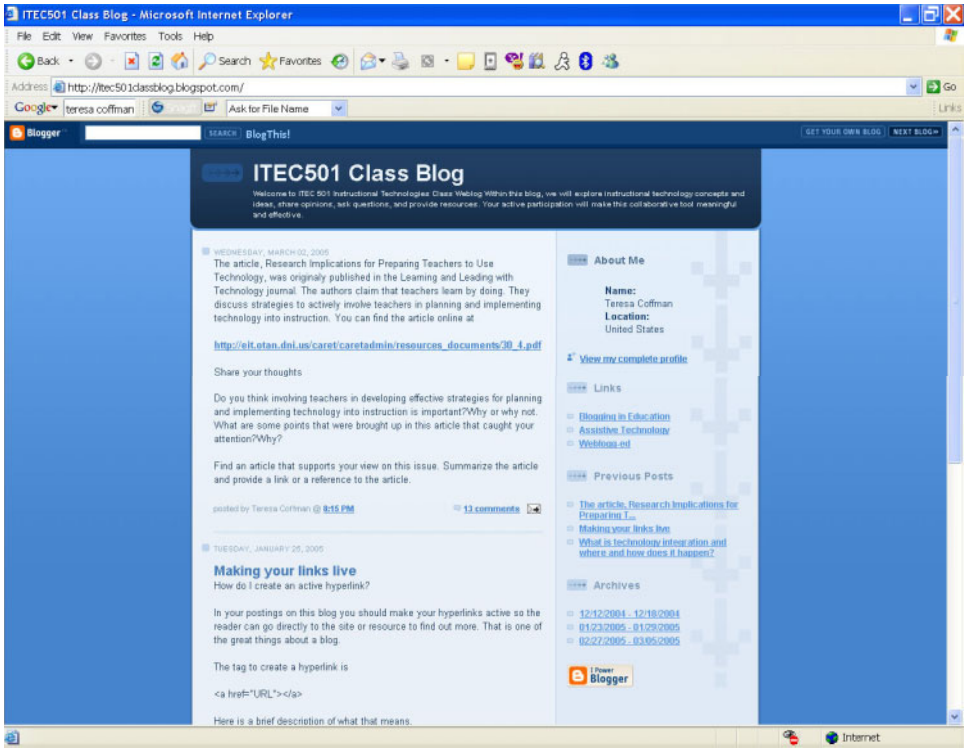
Through their exploration of blogging, students discovered several uses for this tool. For example, creating a class blog to keep parents and students up to date with homework, student projects, and contact information for the teacher. Providing a class blog is an effective way to communicate with both parents and the school administration about classroom activities. Students also discovered that blogging can be used as an informational tool to create a resource page. By creating informational resources, authors are collecting important information that will aid the community using the Weblog. In this case, useful resources were created for other teachers, school officials, parents, and/or students.

Another use of blogging is as a reflection journal. A journal allows students to identify new terms, outline important concepts identified in their readings, highlight important ideas brought out in classroom discussions, and express what was learned by completing a project or activity. Journals are good learning tools. Having a public journal tends to focus students' writing because their peers have the opportunity to read each other's words.

In my classes, we used blogs as both a reflection journal and as a group project where students focused on instructional technology topics and ideas. In each project, students explored topics and provided opinion, research, and resources to readers. They also reflected on their learning goals and objectives throughout the course, providing thoughts and ideas coupled with outside resources for further research.
In each instance, the students had a difficult time in the beginning. They felt uneasy with the public nature of the blog. However, as the course progressed, they began to add to their blog without complaint, taking ownership and expressing their ideas and opinions freely. Many began to go to other blogs and post comments, sharing ideas

Weblogs & Wikis, continued

and redirecting people to their blog. The blog became public and personal. It became a good tool for expressing ideas and exploring concepts in more depth.



Screenshot of a weblog

Teachers began to take this tool to their own classrooms, creating class weblogs that identified classroom activities, student work, ideas, and homework. Teachers also began to incorporate blogs into learning activities. A fifth grade teacher created a blog for her students to discuss books they were reading. An eleventh grade teacher created a blog for her students to verbalize math equations and work through math problems. These students also provided web references on their blogs to help support their ideas and provide additional information for their students. As the class continued throughout the semester, more teachers began to incorporate blogs into their classrooms. It was determined that blogs are good communication and collaboration tools for students and teachers because they encourage students to become experts in the topic, are simple to use, and are public.

Privacy and security

In conducting our exploration of weblogs, students soon discovered one of the recent issues regarding blogging in education. Weblogs, for the most part, are public unless they are hidden behind a password on a school's server. Public means that anyone on the Internet can happen upon a blog and make a comment. Being public is

Weblogs & Wikis, continued

one of the most important features of web publishing, especially with blogs. Communities develop around blogs due to the topic and interest of readers. This means that classrooms can use blogs to connect students from other schools or experts in the field being studied. Group projects can be developed and topics explored with participants both inside and outside the classroom. Students working on similar topics can share thoughts on students' blogs in other classrooms across the country. This activity engages students in meaningful learning. Students become more involved because their work is not held inside the walls of the classroom. It is now global and public. Because others are now involved with their work, the assignment becomes more meaningful.

However, this is also where student security and privacy come into play. A question that must be addressed by K-12 teachers when planning to use a public forum such as a blog is how to keep students safe from the possibility of inappropriate visitors to the student blog. There are ways to help ensure that students are safe. Schools should have an "Acceptable Use Policy" (AUP) that identifies guidelines for Internet use. Teachers should get permission from parents before allowing students to post on a blog. It is suggested that teachers not post a picture of the student on a blog and if a picture is posted, that the student not be identified. Having students not use their full name when they make a posting is another option.

Teachers can attempt to keep their class blogs private by giving access to only students and parents. This is easier if the blogging software is on the school's server because it can be password protected. But teachers can also do this by closing the blog so that no one can post a comment. To do this, though, limits the full power of blogging and limits the opportunity to build a community around the blog, creating a collaborative learning environment.

Wikis

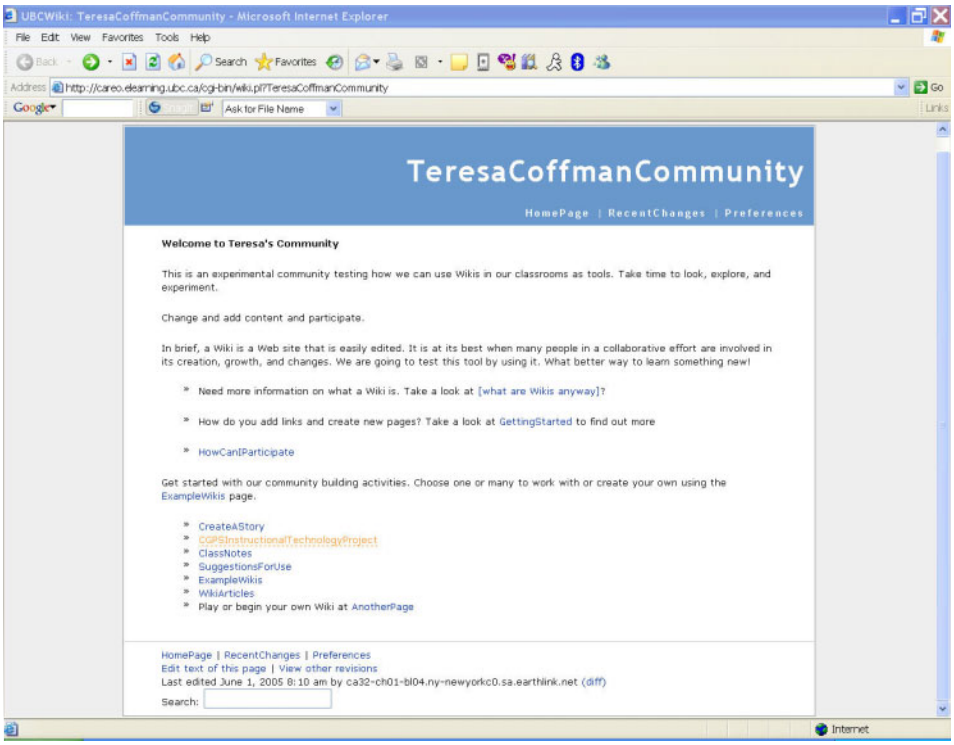
A second collaborative tool explored in my courses during this academic year was the use of wikis. Wikis are easy to create web pages that work best when there is a group problem to solve, a project to work on, or meaning to be made on a particular topic or idea. The great thing about a wiki is that anyone can make changes to the web page. The most popular wiki is WikiPedia, a free encyclopedia that can be modified.

Wikis are different from blogs.. The format of wikis is controlled by the content and the users. Postings are contained within the web page, therefore, they are not in chronological order like a blog. Also, anyone can go to a wiki page and edit, delete, or add to the content. Organizations like this tool because it allows employees to work on projects as a collaborative group. Each member has the ability to participate and take an active role in the project. Once the project is completed, the content can be exported and a report completed (WikiPedia, 2005b).

In my class, students had the task of determining how wikis could be beneficial in their classrooms. Could students work with other students throughout the school, grade, or in other schools on projects and activities that involved planning and idea

Weblogs & Wikis, continued

generation using a wiki? Would this tool be simple and effective? In our initial exploration of wikis, we found they can be somewhat complicated. We had to learn some HTML coding to create links and new web pages. Students found that wikis can be one long web page or linked together to break down the content into meaningful chunks. The simple interface of a wiki allows students to focus on the content and less on the tool.



Screenshot of a wiki

In our search, we found a few free software programs that are available. We also found software that could be placed on a school's server. We chose software that was free and readily available via the Internet. The wiki that was chosen for our purposes is at the University of British Columbia's Office of Learning Technology. This is an experimental web site that anyone in the educational community can use to test and work with wikis. Another resource that schools can use is the seedWiki (*wiki URLs posted at end of article*).

The concept of wikis is to create a network of webbed hyperlinks to join together content. This idea of connecting similar ideas through hyperlinks was a difficult one at first. As the project progressed, it became easier and students began to participate more and take ownership in the project. Students determined that wikis could be utilized in their classrooms by engaging students in the creation of content within a group. This tool was not tested out in any of my students' classes during the semester, but we determined that this tool was useful due to its collaborative nature. Wikis are good for group work. Students can participate by adding information and each stu-

Weblogs & Wikis, continued

dent can build on the information by adding to or changing existing content. After a project is completed, the information in the wiki can be transferred to a word processing document to create a report of the information collected and worked on as a group.

When we searched the Web for "wiki uses" we found that both teachers and schools are using this tool. Wikis are being used as information tools such as school web sites, teacher web pages to introduce homework, and to present syllabi to students. As a collaborative tool, Wikis are being used to work on group problems, share information and resources, and to analyze information and challenge other group members.

Conclusion

Students were excited about the benefits and use of weblogs and wikis in their classes. Allowing students to participate with the creation and maintenance of a weblog or wiki provides opportunities for students to create knowledge and optimal meaning. Consequently, this enhanced opportunities for students to begin to think critically by analyzing content through research and discussion (Jonassen, 2000). The social interaction that each elicits is positive for teaching and learning. Students from elementary grades through graduate school are able to construct knowledge through reflection. Additionally, they have the ability to publish their results real-time in a public space. Through this public presentation, feedback is immediate and scaffolding opportunities are available. Using these media, students are afforded ownership of the content. They are able to interact with others, share ideas, and explore new concepts.

Article Resource Links

Blogging Tool: http://www.blogger.com

KidzLog: http://www.haranbanjo.com/kidzlog/

WikiPedia: http://www.Wikipedia.org

Wiki software: http://careo.elearning.ubc.ca/cgi-bin/Wiki.pl?HomePage

Wiki software: http://www.seedWiki.com/

Examples of how blogging is used in the classroom:

http://bloggingineducation.blogspot.com/

http://careo.elearning.ubc.ca/cgi-bin/wiki.pl?TeresaCoffmanCommunity

Weblogs & Wikis, continued

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About the Author

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A District Plan for Training the New Instructional Technologists

by Ginny Carrigan and Lynda Claspy

In May of 2004, Virginia approved legislation that would fund an Instructional Technology (IT) resource position for every 1000 students in a school system. Although these positions were not mandated until the 2005 – 2006 school year, Prince William County Schools (PWCPS) initiated the program in the 2004 – 2005 school year with an IT resource person in every building. After hiring over 60 new employees, the need for staff development to ensure that all ITs had the same background knowledge became evident. Research shows that technology could improve student learning when ongoing teacher training was provided (Kulik, 1994; Schaidle, 1999). The PWCPS Office of Instructional Technology (OIT) therefore began to organize a scaffolded course of study for these positions.

This course of study would be provided in a variety of ways to meet scheduling needs. The school year began with an intensive face to face orientation session in which vital information was shared. A year long course of study and support was outlined from feedback collected during the orientation session and from needs outlined in the job requirements. To deliver all of this information, both face to face and online courses were developed. A Blackboard site was established to deliver online course material and provide communication between the OIT and ITs.

These new ITs had a wide variety of backgrounds. Many had come from private industry, some were new college graduates, and others were transitioning from non-teaching positions within the school system. Since many of the ITs were new to the classroom and a major component of the state's requirement for these new positions was to collaborate with classroom teachers, it was decided to begin staff development with a module on instructional strategies and collaboration.

As this first instructional module was developed, several key points were considered essential.

1) Knowledge of the curriculum

Instructional technologists were familiarized with the location of curriculum documents for both Virginia Standards of Learning and PWCS objectives. The OIT provided an overview of the four core areas of instruction that are included in SOL testing for all students. Resources for lesson development, pacing guides, test review, and assessment were shared.

District Plan, continued

2) Test analysis

The importance of working to improve student achievement at each location has been emphasized. Each IT has been shown how to access current test data for their school and how to locate specific information not only on curriculum areas but by population and ethnic groups. By knowing specific test data, instruction can be targeted to meet the needs of each student or group.

3) Instructional strategies based on research

An instructional focus in PWCS for the past four years has been developing teaching strategies for improving achievement based on research. The work of Silver, Strong, and Perini (2000) and Marzano, Pickering, and Pollcok (2001) has been shared with all instructional staff throughout the county. These authors have done decades of research and have crystallized the results into useable strategies that have positive effects on student learning. Building on this research, ITs were introduced to the county's instructional process and how these strategies would be incorporated into classroom activities. Sample activities with different teaching strategies were modeled and discussed. And, as part of a yearlong activity, ITs were required to submit a monthly lesson integrating technology with an SOL that demonstrates teaching strategies based upon the accepted research.

4) Instructional activities developed for varied learning styles

As ITs developed lessons, they were encouraged to consider student learning styles. The work of Gardner (1985) in the area of multiple intelligences was used to highlight the need to vary the types of activities they will provide for the students. ITs and teachers were encouraged to do a self-inventory and become aware of their own learning and teaching styles. Reviewing their inventory results assists teachers and ITs in becoming more aware of the need for presenting instructional materials in varied formats. Technology offers many ways to meet the varied learning styles. Weekly discussions in Blackboard have provided the opportunity for ITs to read articles and share ideas on how to meet the needs of individual students through technology.

5) Collaborative techniques with classroom teachers

ITs are located at each building to serve as resources to classroom teachers. They are available to assist in developing lessons and to model and co-teach as necessary. Since collaboration is a major part of their job, a tool for collaborative planning was developed by the OIT and shared during the orientation session. ITs were encouraged to use the collaborative planning document as they worked with classroom teachers so that each person's responsibilities were clearly defined.

District Plan, continued

6) Familiarity with county-provided software

All schools in the county have been provided with basic productivity software to include Excel, Access, Word, and PowerPoint. In addition, schools have been provided with a graphic organizing program, Inspiration, and for the elementary level, Kidspiration. Elementary and middle schools have also been given a basic graphics program, ImageBlender. The county has purchased a site license for Lectora, a web publishing program. This application is available through the county wide application launcher. Knowing that all ITs would be using these basic programs, introductory courses were developed and offered both face to face and online.

7) Differentiation with technology lessons

Using the research-based instructional strategies, information about learning styles, and SOL objectives, ITs, in collaboration with classroom teachers, are working to develop lessons that met the needs of a wide variety of students. The OIT provides assistance through an online course, Differentiating with Technology, and additional face to face in-service sessions are offered to provide model lessons during the year.

Training

Other staff development modules were then developed to address needs of these first year positions. After completing the instructional module, ITs were provided training in two additional online modules in the Blackboard environment.

- The first of these modules dealt with preparing and presenting staff development materials to colleagues. ITs were guided through a four week session which culminated in the production of staff development materials on a topic of their choice.

- The second module began with a face to face session to introduce the topic of technology planning and the state and county technology plans. This introduction was followed by four online sessions which guided the ITs through the process of developing a technology planning committee, a mission, a vision, and one strategy for a technology plan that they would then write for their schools.

In conjunction with George Mason University, a graduate level course was developed focusing on infusing technology in to the K-12 curriculum. This course was offered both during the fall and spring semesters and was made available to ITs as well as classroom teachers in Prince William County. The course dealt with the topics of the first instructional module in greater detail and provided opportunities for ITs to interact with classroom teachers.

In addition to the graduate course, several online courses were developed by the

District Plan, continued

OIT to be delivered through Blackboard. The topics of these courses included: Inspiration online, Webquests, Lectora (web development), and Marco Polo Internet resources. Face to face courses developed included: United Streaming, NetOp School, GroupWise, Image Blender, digital cameras, and Kidspiration.

After developing this course of study, the OIT realized that training for these positions was a monumental undertaking. When reflecting on the amount of time and effort that planning for these first year positions entailed, alternative models of sharing the essential process with others were considered. The annual Virginia Department of Education's Technology Leadership Conference provided an excellent opportunity to share with others in the Commonwealth. We gave a presentation on our experiences in December 2005, which is supported by a web site (URL below). We hope that other school districts will benefit from these resources.

The Office of Instructional Technology personnel at PWCS believe strongly that technology use is not about hardware. As stated by Harvey Barnett (2001),

> what is important is how the technology is integrated with the instructional program. The guiding question technology leaders must keep in mind as they develop their plan are students using technology in ways that deepen their understanding of academic content and advance their knowledge of the world around them. (p. 1-2)

The office presented materials to new staff members so that they would be able to provide this level of support for the students.

Article Resource Links

Presentation of experiences at Virginia Department of Education Technology Leadership Conference:
http://www.pwcs.edu/itech/teaching_strategies/doe/index.html

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District Plan, continued

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Project TILDA: Teaching, Integrating, and Learning in a Digital Age

by Judith M. Davis, M.A., Anne L. Pierce, Ph.D., Arun Verman, Ph.D., & Christina Pinkston Betts, Ph.D.

Project TILDA: Teaching, Integrating, and Learning in a Digital Age is a professional development program for middle school teachers that incorporates data-driven decision making and technology integration to improve student achievement in reading, writing, science, and mathematics. Funded by a State Council for Higher Education of Virginia (SCHEV), No Child Left Behind, Title II, Part A grant, this program is based on a dynamic, flexible model for curriculum planning and technology integration that can be adapted to a variety of learning environments and levels—traditional, blended, or distance courses for K-16 learners.

Several national studies (U. S. Department of Commerce, 1999; Corporation for Public Broadcasting, 2003) have found that the mere presence of computers in schools does not raise student achievement in and of itself, but that such technology, when coupled with high-quality professional development activities, can significantly impact student performance, especially for minority and low-income students. That research is reflected in the National Education Technology Plan (U. S. Department of Education, 2004), which notes that "What is remarkable is what students can do with the technology, curricula and good instruction," but also cautions that the success of classroom technology integration is dependent upon high quality professional development for teachers (p. 29).

Project TILDA addresses this need for high quality professional development through a program of week-long teaching institutes and monthly academic year follow-up workshops designed to improve student Standards of Learning (SOL) performance in reading, writing, mathematics, and science by training teachers to use both traditional and technology-enhanced pedagogies more effectively to meet specific curricular objectives. The project team structures these activities in close collaboration with administrators and subject area heads at the two participating middle schools using the schools' disaggregated SOL data to concentrate training on specific SOL objectives. Since both schools have good technology resources, including laptop teams for many of their students and teachers, a key goal of the project is to complement the school district's current technology training by having subject specialists model best practices for using instructional technology to meet specific curricular goals.

Project TILDA, continued

Project TILDA's training model is based on a highly successful program, the Instructional Technology Assistance Project (ITAP), conducted by the Southern Education Foundation from 2000-2004 through a grant from the Andrew W. Mellon Foundation (Southern Education Foundation, 2000). That program trained faculty members from over 20 historically black colleges and universities to integrate technology and student-centered learning activities across the curriculum. The cornerstone of ITAP was a curriculum-planning model, *Teaching Well Using Technology* (2000), developed by Dr. Barbara Walvoord and her colleagues (Walvoord, Laughner, & Barry, 1999). Informed by Chickering and Gamson's (1987) "Seven principles for good practice in undergraduate education," this program walks teachers through seven steps that yield student-centered, outcomes-based course models.

Teaching Well Using Technology: The Seven Steps [1]

Step 1: Ask, "What do I want my students to learn?"

Step 2: Identify the best teaching approaches for the learning you want.

Step 3: Plan major assignments and exams that will both teach and test the learning you want.

Step 4: Consider times and spaces for learning.

Step 5: Remember what technologies can and cannot do.

Step 6: Sequence the learning and choose the technology.

Step 7: Implement, evaluate, and think creatively.

(Walvoord et al., 1999)

Once participants complete this initial planning process, they are then exposed to both traditional and high-tech teaching tools and learning activities, including discipline-specific software. The Project TILDA team revised the ITAP model to incorporate more rigorous, data-driven decision making and to adapt the basic training model to a middle school setting.

Throughout the teaching institute weeks, participants meet as a group for morning sessions built around common topics such as (a) data-driven decision making; (b) outcomes-based curricular planning; (c) student-centered, hands-on pedagogies; (d) instructional technology integration techniques; and (e) formative and summative evaluation. For the afternoon sessions, participants break into core subject groups to focus on specific learning activities and pedagogical approaches appropriate to the participants' individual subject areas. All of the training materials are built in a Blackboard course shell to allow the faculty trainers to model best practices for technology-enhanced teaching and to allow the teacher participants to experience the Blackboard environment from the perspective of their students. In addition, all participants are given a "teaching tool kit" that includes all of the print and electronic resources used during the week. The following is a sample agenda for these week-long

Project TILDA, continued

teaching institutes:

Sample teaching institute schedule

Day	Activities
Monday	Introduction of participants Data-driven decision making "7 Steps" to better teaching and learning Evaluation and team assessments
Tuesday	Instructional uses of course management software Outcomes-based curricular design Evaluation and team assessments
Wednesday	Instructional uses of MS Office and research techniques Using Inspiration software across the curriculum Core subject interactive pedagogy Evaluation and team assessments
Thursday	Outcomes-based assessment design Hot Potatoes software Core subject assessment design Evaluation and team assessments
Friday	Team time to complete projects Participant project presentations Final evaluation and team assessments

Each session requires the teachers to complete hands-on activities using the teaching strategies and software introduced in the session. The core-subject pedagogy sessions, for example, might involve teachers in using graphing calculators to demonstrate mathematical principles, building crossword puzzles with Hot Potatoes to reinforce knowledge of science terminology, or constructing a web of critical reading activities using Inspiration. As much as possible, all learning activities are presented with traditional and "technology enhanced" options to allow teachers to adapt them to their individual teaching environments and resources.

During the teaching institute, each teacher designs a unit of coordinated learning activities that are intended to meet specific SOL objectives. During the "7 Steps" session, the teachers identify problematic learning objectives in their disciplines, for example, SOLs related to critical reading, writing, and research skills. As the week unfolds, they apply the learning activity models and software options presented to create activities to help their students meet those objectives. At the end of the week, the teachers present their finished projects in a "show and tell" demonstration for all of the participants. Projects from a recent teaching institute included a PowerPoint-based exploration of the African slave trade that guided students through various Internet

Project TILDA, continued

videos and research sites, as well as write-to-learn activities using Inspiration. Another project used Inspiration to create an interactive web quest—complete with links to the Metropolitan Museum of Art's Egyptian collection—to enhance critical reading and writing skills for the book, *From the Mixed Up Files of Mrs. Basil E. Frankweiler.*

The week-long teaching institutes are complemented by monthly follow-up sessions held during the academic year to extend and reinforce the techniques introduced in the institutes and to provide ongoing idea-sharing and mentoring among the participants. These monthly sessions are organized by core discipline, with each session focusing on teaching techniques and/or software solutions for specific problems or objectives related to that discipline. In addition, the teachers use these forums to share their own evaluations, or "lessons learned," as they implement new techniques in the classroom. This focus on continuous evaluation is one of the most important aspects of the project.

Step 7 encourages teachers to "implement, evaluate, and think creatively" (Walvoord et al., 1999). As noted in the studies cited above, too often teachers implement new technologies without sufficient attention to identifying the outcomes they hope to achieve and, just as importantly, evaluating their success in achieving those outcomes. Therefore, this project models strategies for ongoing evaluation of the various learning activities presented and encourages teachers to use similar quantitative and qualitative measures to assess their own technology integration efforts. After every individual workshop session, for example, the teachers complete evaluations using the survey feature built into the Blackboard assessment manager. In addition, they complete project reflections using Blackboard's discussion board and evaluate and critique each other's final project presentations.

As this project approaches the end of its first year of implementation in July, Project TILDA appears to be a resounding success. Evaluations show high levels of satisfaction from the participating teachers, and the continuous demand from other teachers to enroll in the project attests to the effectiveness of the trained cadre of teachers the program has produced thus far. Since one of the goals of the project is to train teachers to mentor and train their colleagues, the growth of the project due to participants' modeling new teaching techniques in their buildings indicates that the participants do, in fact, influence the teaching of others in their buildings. Although final conclusions will not be possible until after summative evaluation of the project is completed in June, all indications are that Project TILDA is improving the quality of teaching, learning, and technology integration for the participating teachers and their students.

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Six Steps to Invest in Humanware to Achieve Technology Integration

by Fred W. Scott, M.A.

How can we make a difference with student achievement and learning using technology? This stalwart question is what our national, state and local governments, societies, and school divisions are asking. A North Central Regional Educational Laboratory (NCREL) article about using technology to improve student achievement states,

> …most research on technology and student achievement has used traditional standardized assessments to measure changes in student performance. This research often has focused on students' knowledge of isolated facts but has paid little attention to how well students think. Much has been learned in the last 15 years about new and meaningful ways to measure what students know and how well they know it. (Honey, 1999, ¶14)

Have the efforts of the past decade of procuring the hardware and software in schools contributed to sufficient change in student achievement? Are we really seeing a paradigm shift in the delivery of instruction, staff development, school leadership, and student performance assessments? School technology departments across our country have been investigating various strategies to answer these rich questions.

To make a difference with student achievement and instructional strategies using technology, the answer is straightforward. We must invest in humanware (teachers, administrators, other personnel). All districts and schools should provide staff development opportunities focusing on instructional and leadership strategies. Our ultimate goal is to prepare all students for the global digital society and to yield productive, marketable, competitive, and imaginative human beings. If the humanware is to mold and inculcate our future generations, it is vital that we give humanware the tools and strategies to help our students succeed.

My definition of humanware is investing in peoples' learning and integrating tools to explore the use of instruction to enrich specific goals and tasks. Let's delve into unique strategies that would make investing in humanware essential for making a difference with student achievement and technology integration. These strategies will answer the five W's of staff development training: who, what, when, where, and why.

Anyone planning to invest money in the stock market would take apt steps to invest his or her capital wisely. Commensurate with investing in the stock market is the need to invest in the technological growth of instructional and support staffs who must also meet certain criteria. The investment must be made wisely, efficiently, effectively, and economically, and its value and growth potential must be assessed. This investment aligned with curriculum

Humanware, continued

blueprints, school improvement, professional development, and technology master plans ensure success for all students and communities, as noted in a report by the American Federation of Teachers (2005);

> A school system's most important asset is its teaching force. And, the most important investment a school board, administrators, and parents can make in a school system is to ensure that teachers continue to learn. Continuous, high-quality professional development is essential to the nation's goal of high standards of learning for every child. (¶ 1)

View teachers, administrators, and support personnel as an investment for technology success. We will be exploring ways that investing in humanware can ensure the success of technology integration through defined steps that will ultimately heighten student achievement. One can view this analogy as an instructional guide for a school, department, district or any other entity that involves developing a staff development plan for student learning.

Let's examine specific steps for investing fully in the humanware of any organization, department, district or school:

1. Define objectives
2. Determine a time span
3. Set the risk level
4. Select the contribution method
5. Provide high-quality training
6. Choose the right method

1) Define objectives

In formulating technology integration objectives for investment it is fundamental to look at what one wants to achieve as the end result. Stephen Covey (1991) tells the reader to begin with the end in mind. Is this possible or feasible with humanware? Is there ever an end? Remember, whatever the vision, mission, and project, there are desired outcomes and the objectives should be specific and clear about what should take place. Make sure the audience for whom the objectives are formulated and the integration skills that will be trained and modeled. Construct "SMART" objectives (Plymouth GP Tutors, 2003; Figure 1).

Planning the objectives for humanware should follow each SMART concept for success. All objectives should focus on the investment targeted and what improvements are needed for student success. Humanware objectives should incorporate the context, process, and context standards outlined by the National Staff Development Council (NSDC, 2001) and the International Society for Technology in Education (ISTE, 2000-2004) standards for teachers and students.

The ABCD method of writing objectives is an outstanding starting point for writing curriculum or technology staff development objectives. Remember to incorporate Bloom's Taxonomy for the different levels of learning (Bailey, 2002).

Humanware, continued

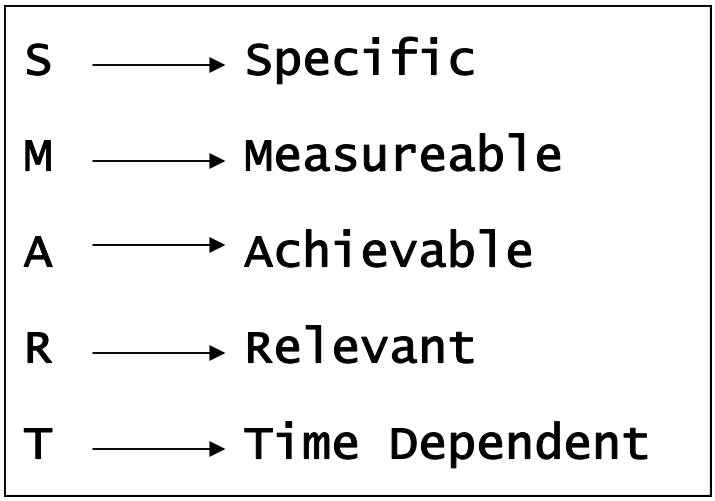

Figure 1. "SMART" Objectives (Plymouth GP Tutors, 2003).

Example Scenario: *The John Orlando High School has been selected by the School Board to receive laptops for all teachers and students. The school's planning team, consisting of the administrators, central office support leaders, instructional technologists, teachers, parents, and students were organized by the principal to begin to develop an implementation plan for the use of laptops at the high school level. The principal, technology director, curriculum director, and teacher (chairperson of technology team) led the planning in two exercises. They assisted the group in writing benchmarks for students and teachers and aligned the benchmarks with the curriculum objectives. Each objective listed how it would be measured, what evidence would show the achievement, and cross-walked with state and national technology standards. The John Orlando High School planning team developed a timeline in a table to identify when each objective would be implemented and measured through observations, student projects, and online surveys.*

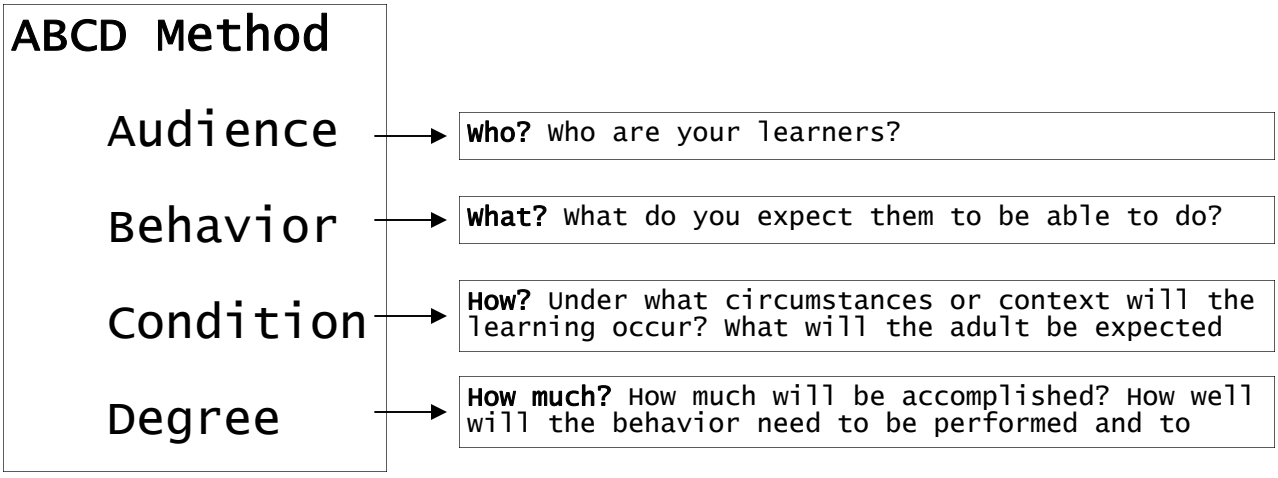

Figure 2. ABCD method of writing objectives (Bailey, 2002).

Humanware, continued

2) Determine the time span

Now that the technology integration objectives are concrete and clearly focused on what the humanware should accomplish, decide when the time span for the training will take place. When investing in the stock market, people begin with a time span: *long, medium or short term* (Table 1). So what does this mean in planning strategies and implementation plans? First, let's explain the terms in order to determine how to handle the investment.

> **Long-Term** investing means striving for small gains to achieve a large return. The staff development time frame is up to three years. The staff development rate of return equals each objective implemented in a comprehensive and well-defined process with yearly analysis of evaluations and empirical data with bi-yearly benchmarks. Direct results should correlate with student learning outcomes and outlined technology staff development activities.
>
> **Medium Term** investing means striving for moderate gains to achieve a moderate or large return. The staff development timeframe is up to two years. The staff development rate of return equals a group of objectives identified and implemented with logical assertive strategies and benchmarks that are flexible with quarterly assessments. Direct results should correlate with student learning outcomes and outlined technology staff development activities.
>
> **Short Term** investing means striving for immediate gains to achieve a direct, small, yet effective, return. The staff development timeframe is up to one year. The staff development rate of return equals an objective implemented with an aggressive approach and ongoing, immediate assessments. Direct results should correlate with student learning outcomes and outlined technology staff development activities.

Establishing the appropriate time frame falls back to the objectives and *when* the results are needed for improvement.

> Example Scenario: *Martha Dallas Elementary School's principal has decided to make a change in how the teachers will integrate technology into instruction. As a high-performing school on state and national assessments, for years the teachers have been mainly teaching the required content in the classrooms, and the computer lab teacher did all technology lessons with the students. The principal wants a new model put into action within a one-year time span. The immediate goal is to change the instructional delivery of the teachers to do the technology integration lessons with the students. The future goal is to enhance instruction through the use of technology to promote expeditionary/ project based learning. The school started off with a short-term plan to meet 25% of its School Improvement Plan objectives with a one-year time span to execute the plan.*

Humanware, continued

Type	Timeframe	School or District's Improvement Plan Objective Percentage	Reform Strategy
LONG TERM	2 to 3 years	90 - 100%	Extensive reform
MEDIUM TERM	1 to 2 years	50 – 75%	Moderate, Flexible reform
SHORT TERM	Up to 1 year	1 – 25%	Brief, Finite reform

Table 1. Determining the time span

3) Set the risk level

Now that the technology integration objectives and the timeline have been established, the next step is the target audience and the risk level of implementation. It is critical at this stage that the plan for training addresses *who* is being trained and *what* risk level should be implemented. The risk level involves the degree of the implementation from the staff development or the improvement plan (Figure 3). There are three major levels of risk in the implementation process. These levels also have three adjacent levels. Each level is the degree to which one chooses to invest in the humanware's strategies and implementation plan (Table 2). Let's explore what they are:

Conservative. Selecting strategies in the implementation plan that focuses on slow change. The targeted audience is gradually trained on the objectives and assessed bi-yearly. The training plan's benchmarks take *slow constant* steps toward achieving the goals.

Moderate. Selecting strategies in the implementation plan that focus reasonably on change. The targeted audience is reasonably trained on the objectives and assessed quarterly. The training plan's benchmarks take *intermediate pungent* steps toward achieving the goals.

RISK	CHANGE	TRAINING STRATEGY	BENCHMARK IMPLEMENTATION	ASSESSMENT
Conservative	Slow	Gradual	Slow-Constant	Bi-Yearly
Conservative-Moderate	Slow-Gradual	Gradual-Rational	Constant Sound	Quarterly
Conservative-Aggressive	Gradual-Direct	Gradual-Assertive	Constant Direct	Quarterly
Moderate	Reasonable	Reasonable	Immediate Pungent	Quarterly
Moderate-Aggressive	Moderate-Immediate	Aggressive-Reasonable	Immediate Dynamic	Ongoing
Aggressive	Assertive	Vigorous	Direct Dynamic	Ongoing

Table 2. Risk levels and ramifications

Humanware, continued

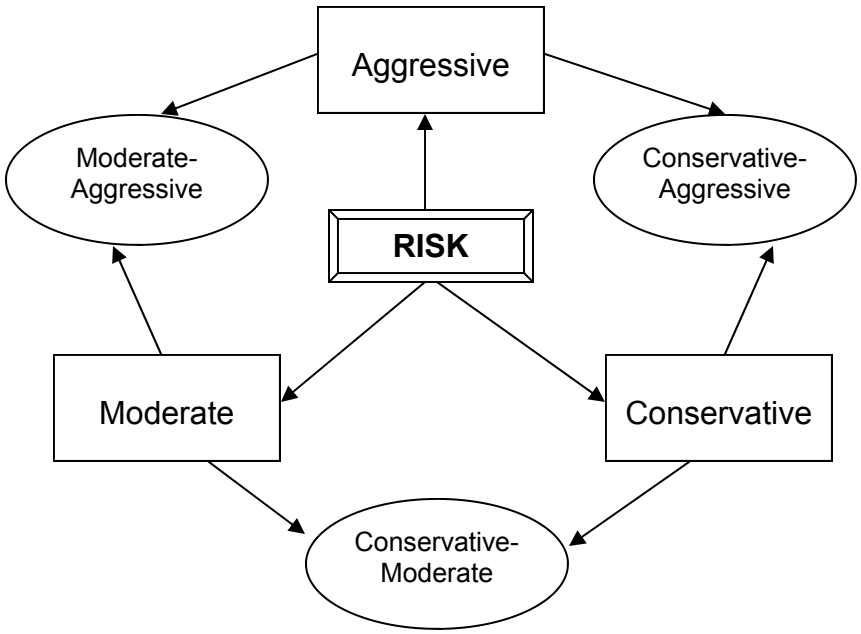

Figure 3. Relationship of risks to strategies.

Aggressive. Selecting strategies in the implementation plan that focus assertively on change. The targeted audience is vigorously trained on the objectives and assessed continually. The training plan's benchmarks take *direct dynamic* steps toward achieving the goals.

Conservative-Moderate. Selecting strategies in the implementation plan that focus on slow-gradual change. The target audience is gradually yet rationally trained on the objectives and assessed quarterly. The training plan's benchmarks take *constant sound* steps toward achieving the goals.

Conservative-Aggressive. Selecting strategies in the implementation plan that focus on gradual-direct change. The target audience is gradually yet assertively trained on the objectives and assessed quarterly. The training plan's benchmarks take *constant direct* steps toward achieving the goals.

Moderate-Aggressive. Selecting strategies in the implementation plan that focus on moderate-immediate change. The target audience is aggressively yet reasonably trained on the objectives and assessed in an ongoing fashion. The training plan's benchmarks take *immediate dynamic* steps toward achieving the goals.

Example Scenario: *The Instructional Technology Department of Winter Park Public Schools identified a need to change the current e-mail system and software applica-*

Humanware, continued

tion for all employees. The goal was to train ll central office personnel, administrators, and teachers throughout the district on how to use Microsoft Outlook and the web Exchange program for electronic communication. The timeline to move all the users over into the new system was nine months. All employees had to be trained on how to access their electronic mail. The risk for this plan was aggressive because all users existing e-mail program was removed right away and the training happened for the work location the day after the removal of the program. The training package was thoroughly organized with consistent content standards and three levels of trainings for the users. The training strategy also involved each school and department so that they could identify the best delivery of training time. The training was direct yet user friendly so the learners could immediately understand how to start their new e-mail, and the trainers assessed every training session to see how improvements could be made for the next school as well as follow-up sessions with previous schools and departments.

4) Select a contribution method

This step describes the process that tackles the funding for the implementation plan. The cost of investing in humanware is invaluable and the investment pays off in the long run with use of hardware, software, and student learning. By the time planners reach this step, the objectives, time span, and risk level have been established. It is time to outline the monetary expense of the implementation plan. The expense can come in the form of funding sources from corporate or private grants, state or federal funds, and line-item budgets. If the plan has an essential need, there are opportunities for the plan to be funded. When proposing an innovative or pioneering staff development plan aligned with quantifiable goals to improve student achievement, one is looking at areas that can receive grants through a myriad of federal, state, corporate, and non-profit entities.

In the financial world, investments are made using one of two contributing methods: *lump sum or monthly contribution*. Let's examine these two methods with regard to humanware.

Lump sum contribution usually comes in the form of educational grants such as federal or state funds. It can also come in the form of corporate grants. A lump sum contribution is used for spending on staff development programs that have comprehensive goals, objectives, and strategies. These programs are embedded with assessment tools and strategic methods that give benchmarks for the spending efforts. These plans must delineate how all children will benefit and improve their achievement through detailed staff development training components. The plans that utilize the lump sum contribution send thorough reports back to federal, state or corporate entities to explain how the funds were implemented.

Monthly contribution usually comes in the form of line-item budgets for continuous training. These funds are always budgeted for a school or department to implement staff development plans. The goals and objectives are defined at the beginning of a fiscal or academic school year. The objectives are usually

Humanware, continued

target a performance need according to the data from the previous year. The funding is short term with only moderate or aggressive risks. Monthly contribution can come in the form of grants (corporate, private, federal, and state) to assist with short-term goals and risks. The plans that utilize the monthly contribution option maintain spreadsheets to document the spending of the plan.

Example Scenario: *The Richard Denver and Shirley Phoenix Middle Schools were selected to participate in a special technology camp focused on project-based learning. These two schools represent two opposite spectrums of geographical location in the district and of the socioeconomic status of students attending the schools. A formal and extensive proposal was submitted to the state department under NCLB Title IID Funds outlining a hypothesis that children from all socioeconomic backgrounds can produce higher-order thinking and collaborative projects with the same level of achievement in their documented projects. The lump sum amount was used for procurement of contracted staff development, new hardware tools, and teacher stipends.*

5) Provide high-quality training

With the first four steps in place, let's critically look at who is providing the training and technology staff development. A good plan can negate itself if the staff development training on the designed topics is not delivered well or in a timely manner. Selecting who will be doing the training falls under two categories: *contractual bond* or *non-contractual bond* or a combination of both.

Contractual Bond. Refers to obtaining an outside company or consultant to deliver a specific designed training plan. The bond is fixed directly to achieving a settled agreement of skills and the agenda is predefined. A contractual bond does not have the ability to do continuous follow up. The contractual bond is usually set for short-term. The personnel should have experience in instructional technology training objectives and skill sets. Referrals from former clients are highly suggested.

Non-contractual Bond. Refers to using established staff development trainers or instructional technologists to deliver a specific designed training plan. The bond is preset directly to defined objectives with flexibility for adjustments. A non-contractual bond does have the ability to do continuous follow up. The non-contractual bond is perfect for medium and long-term spans. The personnel should be internally qualified staff and noteworthy in technology integration training. A sound record of successful trainings should be available as a portfolio or résumé of success.

To provide high-quality training to invest in humanware, trainers share characteristics such as excellent interpersonal skills, creativity, and experience (Figure 4). They

Humanware, continued

should be knowledgeable and have the skills set and expertise. Being able to effectively communicate in an oral and written manner as well as connecting with adults is important to have these interpersonal skills. Flexible to adapt to various environments and teaching strategies is paramount. Trainers should be creative in presenting the information in an original way and have a sense of humor. Offering a positive outlook on learning and being optimistic shows a great attitude that a trainer should possess. He or she should be experienced in the training topics. If a trainer in continuous learner of ideas, then this person is reinventing strategies for delivery of content. If the person is a trainer, this means being a change agent. He or she should be someone who inspires other people to "think out of the box" and promotes how to deliver innovative strategies.

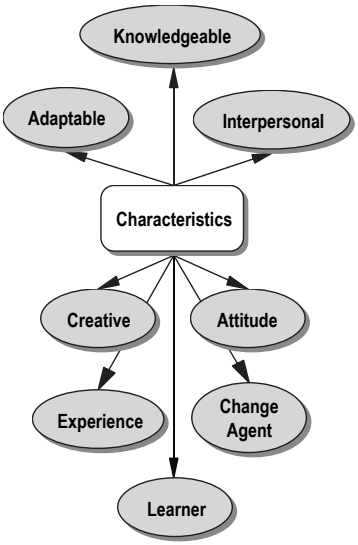

Figure 4. Instructional technologist characteristics.

Example Scenario: *The Hockenburg School District Technology Department has developed a specialized two-year training plan for their technology resource teachers to support the district needs. The focus of the training plan was:*

- *Continuing training on the software applications,*
- *Learning strategies on teaching adults,*
- *Understanding how to be adaptable in training environments,*
- *Promoting Marazano's strategies with technology integration, and*
- *Creating innovative ways to deliver training,*

The department requires the personnel to be highly skilled, experienced, and adaptable to support the schools. The technology teachers are evaluated according to the domains and held accountable for documenting the activities and its outcomes. At the end of the two-year plan, the district will add more personnel to support the schools and educators will be selected by these characteristics: skills set, interpersonal skills, creative ability, teaching & training experience, leadership, professional growth, and personality. These employee benchmarks are also the standard the district's technology department looks for in selecting outside professional development personnel.

6) Choose the right method

Now you have to decide what path will work to make your investment a success. The previous five steps have been outlined with various conduits for a decision maker or team to execute planning for the humanware professional development plan. It was asked at the beginning, "How could we make a difference with student achievement and learning using technology?" We must focus on the people who will be working directly with the students. Change does not occur just by giving access, availability,

Humanware, continued

the latest gadgets, or software programs. All to often educators are looking for quick fix solutions in tangible goods. The intangible goods (all educators) will always be in place as technology changes. It is necessary that the humanware must be invested wisely for systemic change in student achievement and the integration of technology. None of the efforts with procuring hardware or software will make an impact on instruction or practices if people are not invested in a comprehensive manner.

The steps for investing in humanware allow for scaffolding through the strategies and planning to ensure success of humanware and technology integration. Sanborn (2003) states that technology cannot be successful unless we recognize that people who use technology are fallible. Remember, our children will be the humanware carrying the academic torch for future generations. We must provide them with the best possible learning environments to foster critical thinking, innovations, and problem solving to better our society. To get results with technology integration, our greatest asset (humanware) must be nurtured, cultivated, and continuously developed to ensure that the invested technology tools placed in schools make a difference in learning.

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The Use of an Interactive Whiteboard in Promoting Interactive Teaching and Learning

by Diane D. Painter, Ph.D., Elizabeth Whiting, & Brenda Wolters, M.A.T.

In today's society both children in educational settings and adults in workplaces are exposed to a wide assortment of information technology that allows learning and production of knowledge to take place in a variety of ways. Walter McKenzie (2002), former instructional technology coordinator for Arlington Public Schools, asks:

> With the Information Age evolving so rapidly, how do schools adopt a new model of thinking and learning that adequately parallels society's demands? The change is already taking place in classrooms across the country. But, if we as teachers tend to teach in the same ways that we ourselves were taught, how then do we break away from the standardized, homogeneous approach to schooling that we knew as students? (p. 5).

McKenzie claims that the Information Age requires workers to have the ability to access information and manipulate information in a variety of ways using digital tools, allowing them to evaluate information using critical-thinking strategies and problem-solving skills in ways that allow them to interact with colleagues to complete complex tasks and present information and ideas in novel or unique ways.

It appears then that two issues face teachers of today. The first issue is the need to recognize that the Information Age has brought new demands on how we teach our students within classroom settings. Many students come to school already exposed to technology that allows them to learn in a variety of ways at home such as the use of computer game software, interactive learning web sites, television with DVD's, and talking books to name just a few examples. The second issue is how we, as educators, make changes in the ways we were traditionally taught and make better use of technology so that we help our students develop the information, literacy, problem-solving, collaboration and creativity skills they need to be successful in today's workplace.

In March 2004, we (two second grade teachers and the technology resource teacher at Deer Park Elementary School in Centreville, VA) attended several sessions on the use of interactive whiteboards in the elementary school setting at the Virginia Society for Technology in Education (VSTE) Conference in Roanoke, VA. In particular, we saw demonstrated an ACTIVboard that uses a computer connected to a projector and a touch-sensitive whiteboard. The projector displays images from the computer, and the computer is controlled by touching the board with an electronic pen. Teachers can display Internet web sites, run educational software, show live video, and give multimedia presentations, all in an effort to engage students

Interactive Whiteboard, continued

in interactive learning (Fernandez & Luftglass, 2003).

Intrigued by the claims of the presenters at the VSTE Conference that the use of this technology promotes interactive teaching and learning, we asked our school's principal to purchase an ACTIVboard (produced by Promethean, Inc.) for our school. Our principal suggested that we "field-test" the use of this interactive tool with a group of students and conduct a year-long study of its effects on promoting interactive teaching and learning before he purchased other ACTIVboards for use throughout the school. He allocated a resource room close to the second grade classrooms to house the ACTIVboard, and we promptly dubbed the room "The Board Room." He also bought a laptop and a projector that were dedicated for use with the ACTIVboard. In addition, we obtained an Impact II Teacher-Researcher Grant from our school system to support our year-long study. We used the grant funds to purchase ACTIVotes, hand-held voting devices used by the students to record their individual responses to questions asked during the whiteboard lessons. After voting to indicate choices to questions, the students' responses are shown as bar graphs on the whiteboard, showing how many students voted for each possible response and which response was the actual correct one.

During the year we received support and guidance from our school's Teacher Research Team (TRT) as we went through the process of collecting and analyzing data for our research project. Our first guiding question was, "How does the use of the ACTIVboard promote interactive teaching and learning?" We felt this question was particularly important because, as teachers, we wanted to discover and develop ways of using the ACTIVboard that will change our traditional relationship with our students from transmitters of knowledge to enablers of learning. We also wanted to discover how the use of whiteboard technology can be used to tap into the various multiple intelligences and learning styles of our students and to learn what happens when it is used to promote interactive learning and the development of literacy, problem solving, creativity, and collaboration skills with our students. So, our second guiding question was, "How does the use of the ACTIVboard support instructional strategies that lead to the development of literacy, problem-solving, creativity, and collaboration skills of students?"

Literature Review

We began our project by reviewing the literature on the importance of using technology to improve pedagogical skills and promote active student learning. Marzano (1998) conducted a meta-analysis of 100 research reports on instruction and identified and reviewed categories of instructional strategies that enhance student achievement. Then Marzano, Pickering, and Pollock (2001) identified nine categories of instructional strategies that are most likely to lead to enhanced student achievement when they wrote their book, *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*. Brabeck, Fisher, and Pitler (2004) took the nine strategies and showed specific examples of how technology could support those instructional strategies. We believe that the nine instructional technology strategies mentioned in this article can be directly applied to effective uses of the

Interactive Whiteboard, continued

whiteboard:

1. Classroom practices associated with identifying similarities and differences, including comparison and classifying tasks.
2. Summarizing activities (deleting or substituting information that is not critical to the overall meaning of text) and note-taking (determining what is most important and stating that information succinctly).
3. Reinforcing student effort and providing recognition for solving problems, deducing a correct answer, or achieving specific goals.
4. Mastering skills through practice.
5. Learning new knowledge through both linguistic and non-linguistic ways (drawings, images, diagrams, video clips, and kinesthetic movements).
6. Cooperative learning (working with others to complete a task).
7. Setting objectives and providing feedback (including an explanation of why an item is correct or incorrect, letting students know where they stand relative to a specific target of knowledge or skill).
8. Generating and testing hypotheses (planning and conducting simple investigations, formulating and testing questions, making observations, and developing logical conclusions).
9. Using cues, questions and advance organizers to give students a preview of what they are about to learn or experience and to activate their prior knowledge.

(Brabeck, Fisher, & Pitler, 2004)

Methodology

Next, we looked at the features of the ACTIVboard in terms of instructional delivery. Each of us kept detailed journal observations and interview data from 48 second grade students when they used the ACTIVboard. In addition, three other second grade teachers who also taught ACTIVboard lessons provided us with their input based on their own observations of how and what their students learned as a result of using the ACTIVboard.

We also videotaped and photographed various ACTIVboard and follow-up classroom assignments for analysis. Some of the lessons were taught in different ways (traditional instruction vs. ACTIVboard instruction). Differences in student responses to the lessons (oral responses, test or quiz results, authentic student work performances), as well as what students said about the use of the ACTIVboard vs. non-ACTIVboard presentations were noted in the teacher's journals. This was done so that we could compare what the students demonstrated that they knew and could do as a result of the learning sessions using the technology and not using technology.

Data Collector software, a qualitative data-analysis computer program, was used to record each observation or interview entry made by the teachers when they wrote reactions to the lessons. The second grade teachers sent their journal entries as e-mail attachments to the technology resource teacher who copied and pasted the

Interactive Whiteboard, continued

reactions onto the software's data cards. Data collector cards were also created using observation and reaction statements from inclusion special education teachers who observed the lessons. In all, sixty-one data cards were created and then coded according to the following categories:

- Lesson Delivery
- Student and Observer Reactions
- Instructional Strategies (specifically the nine instructional strategies listed by Brabeck, Fisher, & Pitler, 2004)

Using the find and sort feature of the software program, topic cards were created for each category. This process enabled us to explore relationships between concepts and to determine frequency of occurrences.

In order to determine how the use of the whiteboard facilitates and promotes interactive teaching and learning, we triangulated the data from four data sources:

- Our analysis of student work samples completed by students following whiteboard lessons.
- The consolidated information on the Data Collector topic cards.
- The paper and pencil survey responses of the students who indicated what they liked and did not like about using the ACTIVboard.
- What we saw students doing when we reviewed the videotapes and digital images taken during ACTIVboard lessons.

Findings

In addition to looking at how the use of whiteboard technology can be used to improve our pedagogy skills, we wanted to determine how this form of technology taps into the various multiple intelligences and learning styles of our students. Specifically, we wanted to learn what happens when the ACTIVboard is used to promote interactive learning and how it can be used in the development of literacy, problem-solving, creativity, and collaboration skills with our students. Our findings are reported in three areas: lesson delivery, student and observer reactions, and the nine instructional strategies.

Lesson Delivery

We found that delivery of instruction provided us with an opportunity to actively engage our students in a variety of ways from planning stories to reinforcing skills and learning new concepts. Students were able to move images, click on links, and activate sounds and movies with a simple tap and drag of a pen and, in doing so, be easily seen and heard by the rest of the class. Students engaged in collaborative problem-solving skills as they worked in partner and larger team groups. Using ACTIVote devices, each class member's response to questions was counted and the votes were visually shown in bar graphs, tying wonderfully into mathematics. Most of all, using the

Interactive Whiteboard, continued

ACTIVboard helped us make significant changes in how we teach. We were no longer front-and-center purveyors of information.

By far, the most common responses students and teachers made about the use of the ACTIVboard for lesson delivery were related to viewing the lesson. Respondents used the words "brighter," "bigger," "wider," and "clearer" when comparing what they were able to "see" on the ACTIVboard screen to what they view from a computer on a classroom TV monitor. However, hearing sounds was another matter. The laptop's built-in speakers were not very loud. Once we attached external speakers to the laptop, then a whole class could hear sounds such as those embedded in interactive web sites.

When reviewing the data for evidence of student motivation and attentiveness, the words "student-centered" and "involved" were noted most often by the teachers when describing how engaged the students were during ACTIVboard lessons. The teachers were pleased that, when using the ACTIVboard, students could take turns choosing and dragging graphics from various software programs to complete compare-contrast charts, create scenes, and plan a story by filling in story organizers. One teacher wrote in her journal,

> Today we were able to open a story plan in Kidspiration and together, as a class, we planned the characters, setting, actions, problem, and solution for a story. All the kids were involved, including the reluctant writers. As they lined up to go back to class, they were talking about their ideas for their stories.

She continued to describe how "eager" and "excited" her students were to complete a follow-up lesson once they returned to their classroom.

> When we got back to the classroom, they were very eager and excited to start their stories. They sat and wrote for about 30 minutes, which is quite a long time for sustained writing at this time of year in second grade. Most of them actually finished drafting their stories, which is unusual for one sitting. Most of the children had a beginning, middle, and end. Most followed the plan pretty closely, adding some new ideas.

Student and Observer Reactions.

The words "fun" or "liked" were the most frequently used words when students were verbally asked to describe their reactions to the ACTIVboard lessons (sixty-eight times as noted in the sixty-three data collection cards.) They gave a variety of reasons as to why they liked using the interactive technology, but the most common reasons were:

- They liked moving graphic objects around the screen with the pen.
- They liked using the ACTIVotes to indicate their choices for answers when the teachers asked quiz questions.
- They liked playing an instructional game or engaging in an interactive web site activity with other team mates on the board with the whole class being able to watch and cheer them on.

Interactive Whiteboard, continued

Observers (two special education inclusion teachers and a visiting technology specialist from another school) noted the value of using this technology for tapping into multi-sensory avenues of learning. For example, when the technology resource teacher taught a lesson to fifth grade students who were learning to plot points on a grid to win a race car game, a special education teacher wrote in her observation/reflection about the lesson:

> I liked it because you know there are always students who are not going across and up/down to plot points during the classroom lesson, and in a big group with everyone working at a desk, it's not always easy to see who is doing it wrong. With the ACTIVboard, we were able to watch each student plot their path and correct them as needed. Also, the students loved watching the activity so they had the reinforcement of watching others plot their points. Since they were trying to "win" the race, they were very motivated and paying strict attention. It is hands on, which uses a kinesthetic sense, so hopefully more students will remember the lesson.

The technology specialist who visited us from another school noted in her observation/reflection report to us that when ACTIVotes were used, "the students' votes were compiled and shown as bar graphs with class discussions focusing on how people used factual thinking. Students were able to make choices and shared their preferences for making responses to questions [posed by the teacher]." She also noted that the use of the ACTIVotes was especially good for reviewing previously learned lessons for tests.

Nine Instructional Strategies

How does the use of the ACTIVboard relate to improving pedagogical skills and promoting active student learning? We looked for evidence in our data that addressed the nine instructional technology strategies that Brabec, Fisher, and Pitler (2004) said are effective in promoting student achievement. We found evidence that the lessons the teachers taught using the ACTIVboard fell into each of the nine categories:

Similarities and Differences. Most of the ACTIVboard activities involving comparing, contrasting and classifying concepts were math, social studies and science lessons:

1. Students matched money words to images and values of coins.
2. Students used highlighting pens to show patterns on a 100's chart.
3. Students used clipart to show similarities and differences between the United States and Mexico (people, places, and traditions).
4. Using images, students completed compare-contrast charts to indicate the characteristics of insects.
5. Students chose images to show "opportunity cost" in an economics lesson by showing two objects on a screen (such as a hamburger and a teddy bear) and asking the students which one they would want to have. Once an

Interactive Whiteboard, continued

object was chosen, the other was dragged from the screen showing the remaining object. The object eliminated was known as the opportunity cost because it was the object that was sacrificed.

Summarizing and Note-taking. Graphic organizers and list charts were most commonly used for writing and reading lessons:

1. Completing story planners to write fairy tales or story retellings.
2. Completing data retrieval charts with images of animals so students could have visual reminders of ideas to use when writing about the animals.
3. After reading a "big book" on the ACTIVboard screen, students completed column lists of short vowel words found in the story.

Reinforce Effort and Recognition. Voting with the ACTIVotes and seeing how votes were cast through bar graphs reinforced correct responses. Students actually cheered when their whole class gave a correct answer. Oral discussions often occurred, giving students opportunities to discuss why they had chosen specific answers.

Homework and Practice. Some of the PowerPoint presentations teachers created and used with the ACTIVboard were posted on the school's Blackboard web site for homework review. Practice activities using the ACTIVboard in school included lessons on:

1. Using counting back strategies while using number charts.
2. How to study spelling words using "look, cover, write, and check" spelling practice exercises.
3. Re-grouping in math using virtual manipulatives (ones and tens blocks).

Linguistic and Non-linguistic learning. Using graphics to illustrate words and concepts was the most common use of the ACTIVboard. However, having students move word boxes to complete CLOZE reading sentences was another way for teachers to assess students understandings. Other specific lessons were:

1. Creating maps to include mountain ranges, rivers, and lakes using a template map of the USA.
2. Demonstrating the concepts of "how many more?" by creating stacks of virtual blocks to compare number values.
3. Using graphic images to convey story elements (Example- a student used an unhappy face, a deer, and a skunk to convey the "problem" in the story that involved a skunk spraying a deer in the forest).

Cooperative Learning. Students worked in pairs, teams of students, or one at a time when responding at the board. When using the ACTIVotes, they worked in pairs or alone when voting. Students had to discuss their choices with one another, giving rea-

Interactive Whiteboard, continued

sons for those choices, and at times they had to "negotiate" in order to come to a compromise.

Setting Objectives and Providing Feedback. Using the ACTIVboard to use images or story planners to retell stories or create a story was the most common example of setting objectives. Again, the use of the ACTIVotes was the most common way to provide feedback to responses.

Generate and Test Hypotheses. Making observations and developing conclusions were most evident when the teachers developed PowerPoint presentations to teach students about science and social studies concepts. For example, when showing a presentation on the Hopi Indians, students were shown pictures of pueblos built under cliffs. When asked why they thought the houses were built there, students had to discuss (collaborate with one another) to generate viable reasons and then used ACTIVotes to give their best responses.

Using cues, questions, and advance organizers. Comparing, contrasting, and categorizing activities gave children opportunities to see a preview about what they would be learning, activate prior knowledge, or review concepts previously taught:

1. Using story planners, students used images and words to show beginning, middle and end of stories.
2. Using VENN diagrams, students used cultural, political, and economic images relating to Mexico and the U.S. to show their understandings of same and different.
3. Students found images of creatures to show which creatures are insects and which are not insects.

What were the carry-over effects of the ACTIVboard lessons? Many of the lessons began in the ACTIVboard room and involved follow-up work in the classroom. One second grade teacher gave this example of how she saw the use of the ACTIVboard tying into two areas of effective technology uses:

> We did a math lesson today in the boardroom about adding two-digit numbers. We used ten sticks on the ACTIVprimary software to add two-digit numbers in the tens counting pattern. The children recorded the answers in their math book. They took turns using the ten sticks on the board to help solve the problems. After doing three or four problems together with the tens sticks, the kids seemed to understand the pattern. Most were able to quickly solve the problems without using manipulatives. When we returned to the classroom children independently completed a practice paper with these kinds of problems; they all did very well. This lesson incorporated two strategies: homework and practice and nonlinguistic representations.

Interactive Whiteboard, continued

There were also a number of unexpected examples of extended student thinking. During an observation that the technology resource teacher made during the Hopi Indian lesson, she noted:

> I noticed one boy making a math problem out of each ACTIVote response. For example, in one response six students voted one way, and nine students another way to the question, "Which Hopi game would you like to play? The dart game or field hockey?" After looking at the bar graph showing six and nine votes, he said, "That's six plus nine, making 15 of us!"

During the same lesson, she observed:

> A girl student offered a suggestion to her teacher after the class had just used the ACTIVotes to make a response to a question, "You should add a question to that. You should ask the children which vegetable (based on what the Hopi eat) would you like to eat? Corn? Beans? or Squash?"

In this case, the young girl was thinking like a “test creator” and thinking her teacher should be asking children to express preferences for their responses.

Conclusions and Implications

For the most part, students did not have trouble using the ACTIVboard pen to click and select objects on the screen. However, clicking to drag objects was a problem for some children since they had to remember to keep the pen straight and not hold it at an angle. Also, students and teachers had to remember to stand slightly off to the side of the screen because standing in line with the light from the projector tended to cast a shadow on the screen.

The height of the board should also be considered when setting it up for primary students. Quite often we noticed very short students having difficulty dragging images or clicking on spaces that were at the top of the board. Our board sits on a stand and the legs would need to be adjusted so the board sits lower to the floor if it remains designated for primary use.

Another consideration to make when setting up the ACTIVboard is finding a room that is big enough for a whole class. The room dedicated to the ACTIVboard at our school did not allow adequate space for students. Students seemed crammed in a small room and it was often hot during the winter months. Children had to sit on the floor since there was no room for desks, tables, or chairs. Getting to the board to take a turn was difficult and students did not have the opportunities to respond using manipulative objects or writing/drawing materials as they would have if the board had been in a classroom with the students sitting at their own desks. Students wanted to get started on their responses to the ACTIVboard lessons right away, and the time it took to travel to and from the board room was time consuming and this seemed to destroy the momentum of a lesson.

What will be the future use of interactive whiteboards at our school? The second grade teachers would like to see one in each of their classrooms. It is evident from what they have learned and the lessons they have used and developed that it would be used on a daily basis in all subject areas. Who knows, when we share this

Interactive Whiteboard, continued

report and demonstrate the lessons to the rest of the faculty, there may be a stampede of teachers on their way to the board room to sign up for its use.

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Interactive Teaching & Learning Using the ACTIVboard

by Elizabeth Whiting

How does the use of the interactive whiteboard promote interactive teaching and learning?

How does the use of the ACTIVboard support instructional strategies that lead to the development of literacy, problem-solving, creativity and collaboration skills of students?

For years we have mainly used technology as a vehicle for kids to reinforce and demonstrate what they have already learned. A few years ago, my principal asked the technology committee, "How are you using technology for instruction?" We replied with droves of projects used to reinforce and display what the kids had learned. The kids had made slideshows in KidPix multimedia software. They had created projects using the software Claris for Kids. The list went on and on. She repeated, "How are you using technology for instruction?" After much thought we named Windows On Math and Windows On Science laserdisc technology and one or two other software titles that actually helped teach information. It was an “Aha” moment for me. Since then, I have given much thought to the question.

After receiving a laptop last year from my school district, I latched onto PowerPoint, excited about the possibilities for using technology for instruction. The one thing that I was not satisfied with was the quality of a presentation, interactive or demonstration, on a tiny little TV screen way above the eye level of the students. Then, last spring I saw a demonstration of the interactive whiteboard at the state technology conference. The possibilities for positively impacting student achievement were immediately obvious. The interactive whiteboard is big enough for all to see. It is truly interactive because students become actively engaged with the screen itself. Students can manipulate information directly on the screen by using an electronic pen to drag images, write or draw, highlight information and activate links to cause actions or sounds which then can be seen easily by everyone in the class. This is different than traditional passive viewing of information such as a math problem, spelling word or concept presented on a T.V. screen projected from a laptop. When viewing information from a large T.V. monitor, students could only respond by mimicking what they see and hear, by manipulating concrete materials, or by writing on paper at their desks.

Students can also interact with the ACTIVboard using wireless devices called ACTIVotes. Each child has a wireless device that can be used to answer questions. Talk about truly interactive and engaging! Every single child in the class can become involved with the lesson and can respond to every single question posed by the teacher.

We started slowly, by introducing the kids to the whiteboard and

Whiting's experiences, continued

showing them how to use the pen. The children learned quickly and we were able to easily move on to lessons directly related to the curriculum. The kids were enthusiastic. Each day as I reviewed the daily schedule, the children cheered every time I announced that we would be taking a trip to the "boardroom." I documented each lesson taught on the board and the follow up activities and lessons in the classroom in my research journal. In my special education inclusion classroom, I began to notice patterns of involvement and achievement by children identified with special needs, and by children who were not formally identified, but who I suspected had some special needs. I noticed the same kinds of patterns with the average learners. Reluctant writers were becoming involved in the writing process. Students with severe processing deficits were quickly performing math computations. Students with attention difficulties were listening, paying attention and participating in lessons. Many students were asking questions and making comments that reflected a deeper level of thinking than I had previously seen.

We entered this research project to look for evidence that the interactive whiteboard truly does have a positive effect on student achievement. Specifically, we wanted to look at how the interactive whiteboard would lend itself to the nine research proven instructional technology strategies influenced by a meta-analysis of research on instruction conducted by Robert Marzano (1998) as noted in the article *Building Better Instruction: How Technology Supports Nine Research-Proven Instructional Strategies* (Brabeck, Fisher & Pitler, 2004). In my own research, I found all nine strategies were evident, but that there were two in particular that were easily integrated with our second grade lessons using the whiteboard and that are key strategies used to help second graders learn. They were "non linguistic representations" and "similarities and differences."

The "nonlinguistic representations" strategy is one that most primary teachers realize is extremely important, but one that has always required much work to prepare and include in lessons. The board made this easy to do. For example, I have always taught ordinal numbers by gathering 20 objects from the classroom and my home, displaying them in front of the classroom, then having kids label them with ordinal numbers. On the board, I dragged 20 objects onto the screen and the kids labeled them. It took much less time and the kids understood the concept with no problems. We used the board to show PowerPoint presentations about American Indians and forest animals and famous Americans and Ancient Mali and the list goes on and on! We brought in photos from the Internet of actual people and animals and artifacts related to these areas of study. We used virtual manipulative objects to teach math lessons. We used pictures in the software Kidspiration to plan stories for writing workshop. Using pictures and tactile activities to teach second graders is a strategy so important to teaching second grade that it is probably used by many teachers who do not know of its research proven background. The interactive whiteboard makes it easy and natural to use this strategy in lessons across the curriculum.

The second strategy from the effective instructional technology research that I feel is so important to second grade teaching and learning is "identifying similarities and differences." Comparing and contrasting ideas is a powerful way to help children

Whiting's experiences, continued

understand concepts. Again, the whiteboard made it easier than ever to apply this important strategy. We could look at large pictures of actual coins, and compare their physical characteristics to help the kids remember which coin is which. We dragged pictures of different animals onto a T-chart labeled "insect/not insect" and compared the physical attributes to help us do the sorting. We compared photos of people from Mexico to ourselves and compared their clothing, shelters and food to our own. We used a gigantic 100 chart to highlight numbers and find patterns within those numbers. Again, this strategy could easily be applied to lessons across the curriculum using the whiteboard.

These examples show that the interactive whiteboard not only had a positive effect on student academic performance, but I found it very easy to integrate lessons on the board with the content and instructional strategies that I had been previously using. Of course, research-proven strategies are very important to good instruction, but anybody who has ever taught in the classroom knows kids have to be engaged, motivated, and having fun. Again the interactive white board fills this requirement. The students (as well as all the teachers in our study) have loved every minute of our time in the "Boardroom." We are learning together and I see this technology as the future for teaching and learning in primary grades. Someday I hope there will be one in every classroom.

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My Experiences with the ACTIVboard

by Brenda Wolters, M.A.T.

Ever since I started teaching first and second grade, seventeen years ago, I have spent an unbelievable amount of time scrounging for visual images large enough for the children to see and with which to interact.

In my first year, I created my own posters, coloring with markers on posterboard into the wee hours of the morning. I would then use rolls of clear laminate to cover the posters and let the children write on them with permanent markers. Of course, then I had to clean them off with that stinky hairspray. After working a year, I was able to buy some posters and I even had them laminated for protection. I learned to have the children use colored overhead markers to write with, as they easily cleaned off with water.

In the meantime, computers appeared in the classrooms and we were eventually able to use the Internet to find large, colorful images to print and make posters. Using the television screen hooked up to the computer to show pictures from the Internet was even more exciting, except that the images still weren't large enough. The only time I was truly satisfied was when I borrowed the projector and hooked it up to my computer and displayed the pictures on the movie screen in my classroom. Yes, it was big enough, but the children could only sit and look at it. I started to miss the old reel-to-reel movie projectors. There had to be something even better!

Imagine my surprise, when I attended one of the sessions at the VSTE conference in March 2004, and, there, at the front of the conference room was a large interactive whiteboard doing everything I had always hoped for. The images were BIG, the children could write and they could draw on the board, and they could even click and drag images across the board! They could go to a web site and do everything that one could do at a computer. This wonderful invention was called the ACTIVboard. I was in love!

My principal, being the supportive administrator that he is, agreed to purchase an interactive whiteboard to be piloted by myself, a teammate and the technology specialist at our school. The technology specialist even helped us write a grant and we won money to buy an intriguing set of accessories for the ACTIVboard, called ACTIVotes!

Planning lessons for the ACTIVboard became a time-consuming compulsion for me. I'm sure I was more excited than the children, although they cheered every time the whiteboard was listed on the daily schedule. We happily clicked, dragged, wrote, drew and created with and on the ACTIVboard. It was everything I had ever imagined or hoped for. I taught spelling, writing, math, science and social studies using the ACTIVboard. I created some lessons, but there were hundreds of lessons and activities already available. After each lesson, I asked for the student's reactions, and invariably, they commented on how much fun it was and how well they could see everything!

A few months into the 2004-2005 school year, our ACTIVotes arrived.

Wolters' experiences, continued

Each child answers questions typed on the ACTIVboard flipcharts with these hand-held mouse-sized objects. For example, if a flipchart was created about the Powhatan Indians, then at the end of the informational section, questions could be typed to test the students' understanding of the concepts/ information presented in the flipchart set. Each child could answer A, B, C, D, E, or F by pointing their ACTIVote at the ACTIVboard and pressing a lettered button. This vote is recorded into the ACTIVboard software and is tallied and presented in graph form. Then the correct answer is given and the children are given immediate feedback on their answer.

Of course, the children were thrilled with this new educational toy. They easily mastered the ability to use the ACTIVotes and were eager to share their knowledge. Imagine that! They were excited to be quizzed! The ACTIVotes enabled even shy students to contribute their answers to a group discussion. As I learn more about the ACTIVboard and its possibilities, I'm sure I will discover even more ways to use the ACTIVotes.

So, how has the ACTIVboard and ACTIVotes impacted the learning of my second grade students? Using the nine categories of instructional strategies identified by Marzano, Pickering and Pollock (2001), I found that six of the nine strategies were supported in MY lessons through the use of the ACTIVboard and the ACTIVotes.

Speaking specifically of the ACTIVotes, I would like to focus on strategies three and six, "reinforcing effort and providing recognition" and "cooperative learning". "Reinforcing effort and providing recognition" deals with students' attitudes and beliefs. It discusses how important it is to reward students for achieving specific goals. The ACTIVotes do this by rewarding students because it is fun to use and gives them immediate feedback on their progress. Strategy six, "cooperative learning" involves using informal or formal groups as a powerful instructional strategy. As the children use the ACTIVotes there is much discussion about the answer they are going to choose. They spend a minute sharing their ideas/opinions with their classmates before choosing an answer. Sometimes they learn that they should have trusted their instincts and sometimes they wish they had listened to the majority. But it is all learning and it is all very exciting to see.

The ACTIVboard is the most innovative teaching tool I have used since I first turned on an Atari computer in my classroom seventeen years ago. It enables me to teach students using a brand new, exciting hands-on method. The entire class can easily see everything on the board and the students can interact with the information that is presented to them. It has completely changed the way I present new social studies and science topics. Using the ACTIVotes with flipcharts hooks the child into enjoying learning because of their active role. Imagine learning about American Indians, famous Americans, the Sonoran Desert and the ancient empire of Mali sitting in a darkened room, watching larger-than-life size images of people, places and things, Not only are the images easier to see than in a book or on a computer screen, the ante is upped when I hand the children a cool tool to record their answers. When not using the ACTIVotes, students can use a stylus to circle answers, draw lines to connect like objects, and write, draw, type and access numerous clip art objects. The ACTIVboard has done more for advancing the art of teaching, and, consequently, the art

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of learning in my second grade classroom than anything I have ever used.

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