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Contents

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Desperately Seeking Scaffolds

by Greg Sherman, Ph.D.

Editor's note: By way of introducing Dr. Greg Sherman as part of the VSTE Journal editorial committee, the article he wrote for the November issue of the VSTE Edge appears here.

Most people need some measure of help acquiring new skills, knowledge, or attitudes, especially when the learning environment is defined by information and experiences that are relatively new and/or unknown. Tutoring, mentoring, and apprenticeships represent some of the more common ways in which individualized help is provided to learners. Indeed, the amount and type of support offered within a learning environment probably constitutes the biggest indicator of potential learner success. Excellent teachers provide many different types and amount of support (or "scaffolds") for individual learners who are immersed in instructional tasks that require a certain degree of individualized guidance.

But providing support for individual learners as they negotiate complex learning environments is not always easy for teachers. With limited resources and large class sizes, teachers must often rely on existing support structures to help learners succeed in the classroom. These resources might include tutors (classroom aids, parents, or advanced students who already possess the skills to be learned), book resources (if they are well designed), and the clear presentation of examples, non-examples, and other lecture-type information designed to facilitate the learning of specific skills.

Today, teachers might also use available technology such as networked computers to help provide support for individual learners. But teachers may under-utilize technology as an instructional support mechanism if it represents something that learners must also be supported in using! However, by closely examining a variety ways in which technology can help support learners, professional educators might be encouraged to learn more about the different ways they can improve the effectiveness of their instruction. The suggestions below present some specific ways in which technology (specifically, computer-based and video resources) can be used to scaffold students throughout a learning experience. These support mechanisms are categorized by type of scaffold.

Scaffolds, continued

Procedural
Procedural scaffolds provide guidance on how to utilize instructional resources and tools.

- “How-To” sheets created with a word processing program
- Computer-based tutorials, video-delivered directions
- Maps, overviews and diagrams obtained from the Internet

Process
Process scaffolds help learners figure out where they are within an instructional experience. They also help learners figure out what they need to do to get where they want to go within an instructional experience.

- "Big Picture" developed using concept-mapping software
- History of user path throughout program or website
- Clear menu structures and site maps help learners organize web-based information

Conceptual
Conceptual scaffolds provide guidance over what the learners should consider or reflect upon throughout the learning experience.

- Visual advance organizers presented using PowerPointCourse concept maps and "Big Pictures" created using concept mapping software [i.e. Inspiration]
- Moderated chat and bulletin board discussions about specific topics

Metacognitive: Planning
Metacognitive scaffolds represent mechanisms for learners to receive guidance on how to best think about problem(s) under study. Planning scaffolds allow students to set goals and objectives, chart benchmarks and deadlines for projects, create concept maps, etc.

- Concept maps
- Organizational schemes supported with computer-based file management [i.e. “Activities & Materials” folder, “In-Progress” folder and “Completed” folder]

Metacognitive: Regulating
Regulating scaffolds help students monitor their progress and receive feedback on

Scaffolds, continued

their performance

- Peer feedback via web-based discussion groups
- Video-delivered modeling for comparisons
- Computer-based quizzes
- Interactive practice exercises

Metacognitive: Evaluating
Evaluating scaffolds allow students to critique one another's work, exchange documents to-from the instructor for revising, etc.

- Rubrics and checklists created using word-processing software
- E-mail with attached documents

Strategic
Strategic scaffolds help learners figure out various approaches to solving problems.

- Moderated chat and bulletin board discussions about specific topics

Interpersonal
Interpersonal scaffolds provide guidance for facilitating constructive collaboration and interpersonal interactions.

- Modeling/examples provided via video examples
- Interaction checklists developed for debriefing interpersonal interactions following group activities
- Charts displaying specific role assignments
- Mediated discussion and chat environments in which roles are assigned to members of online groups

Including adequate support mechanisms within any given learning experience is essential for those teachers designing instruction that addressed individual learner needs. Taking advantage of available technology resources in the design and implementation of learner support mechanisms is one way teachers can continually improve their effectiveness. Additionally, teachers examining existing lesson ideas presented in textbooks or lesson archives should carefully consider what types of scaffolds will need to be available to individual learners in order for them to successfully negotiate the entire learning experience. Hopefully, the information presented above, as well as the linked articles (see “Resource URLs” at the end of the article), can be useful tools in this effort.

Scaffolds, continued

Article Resource Links

Lessons in Effective Teaching (Virginia Tech)
http://www.edtech.vt.edu/edtech/id/interface/help.html

Schools, Skills and Scaffolding on the Web (San Diego State University)
http://edweb.sdsu.edu/people/bdodge/scaffolding.html

Open Learning Environments (Indiana University)
http://www.indiana.edu/~idtheory/chapter_6_summary.html

Webquest for Comprehension Development (University of Virginia)
http://curry.edschool.virginia.edu/go/edis771/webquest2000/student/ssusandigiac/scaffold.htm

Design Principles for the use of Scaffolds (Berkeley)
http://www.kie.berkeley.edu/transitions/scaffold_principles.html

About the Author

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Do We Need to Change How We Assess Learning?

by Gary L. Whitt, Ph.D.

Johnny sits in a classroom for many hours a day engaged in a host of activities designed to help him learn. One moment he is busily helping his group assemble gathered materials into something resembling a puzzle map of North America, the next he is calling out spelling words to a classmate, and later he is listening to the teacher explain the various parts of a letter. Indeed, during the course of his day in school, because his teachers are creative and good at what they do, he will operate in many different modalities: visual, aural, and kinesthetic. He will take in new information rich in sensory cues and that information will have associated with it sounds, shapes, smells, touches, and spatial orientations, a veritable cornucopia of sensory input surrounding Johnny, linked together in his memory (Anderson, 1995; Cann & Ross, 1989).

However, when it comes time to ascertain exactly what Johnny has learned, he receives only one kind of clue, one kind of cue. All the important assessments of Johnny's learning, the tests which determine if he is ready to advance, to take advanced courses, and to go to college, are text-based tests. His learning environment is brimming with sensory input, his testing environment is not. All the cues so prevalent during learning have been stripped out and reduced to the text on the page before him. And looking at the words on the test in front of him, he just can't remember exactly what it was he was supposed to remember. He remembers quite a lot about the environment surrounding him when he was learning the information, he just doesn't remember that exact bit, and is forced to leave that part of the test blank. So, does Johnny do poorly on the test because he didn't learn what he should have or does he do poorly because he wasn't given the retrieval cues he needed to remember? The test was textual, but when Johnny was learning the material, the teacher had students in groups and was talking to them intermittently. If the test modality had been changed to more accurately reflect Johnny's learning environment, would his score have increased?

Obviously, the answers to these questions are very important. After all, parents and students trust educational institutions to accurately assess learning and to use these assessments to guide decisions regarding the future. And really, in years past, there were precious few options to text-based

Changing Assessment, continued

testing. However, with the advent of increasing numbers of computers in the classroom, assessments incorporating multiple modalities are quite possible. These multimodal computer-delivered tests might contain pictures and sounds as well as text. But, are these types of tests necessary? Would they more accurately reflect what students know? Would test scores change appreciably if test modality changed? Common experience, information processing theory, and experimentation regarding the effects of testing modality on test performance are very suggestive and indicate that educational testing practice may need to change.

If you've ever seen old re-runs of "This is Your Life" on television you know how powerfully additional environmental cues can aid memory. It often happens like this: the man whose life is in review is standing center-stage and trying to recall just exactly who it is who "always believed in you, from the very beginning, and bought a pair of shoes from you when you were selling them in the neighborhood just to prove it". The man is clueless, has no idea who it could be, and awkward silence follows. The lady speaks from off stage and the audience hears her quavering alto intone, "You weren't a very good shoe salesman, but you were a good friend." The man's face brightens with recognition and a smile, "Mrs. Freeman!" He remembers her but it was touch-and-go for a minute. If not for the voice of the woman he would have been searching his neurons still. We've all had similar experiences. We can almost remember but we just need one more cue. We don't need help with the answer; we just want one more clue relating to the time when we encoded the answer. Just give us one smell, one taste, one sound, one directional hint and we'll give you the answer.

The theory surrounding the encoding and retrieval of information, information processing theory, also strongly suggests that our ability to remember information is closely linked to the retrieval cues that are provided on the test.

Alan Paivio, father of Dual-Coding theory, held that there are two representations of every event in memory, visual and verbal. Both representations are accompanied by their corresponding environmental cues, environmental traits that accompanied the target memory at the time of encoding. The more closely the retrieval cues represent these environmental cues the greater the likelihood of recalling the information (Paivio, 1986).

Craik and Lockhart, developers of the Depth of Processing theory, posit that memory places real emphasis on the appropriateness of the retrieval environment and suggest that test type has as much to do with recall as the strength of the memory trace (Morris, Bransford, & Franks, 1977).

Endel Tulving, father to the theory of Episodic Memory, agrees and goes so far as to say that:

> what a person remembers about an event, and how well, depends not only on the nature of the event and its encoding, but also on the conditions prevailing at

Changing Assessment, continued

> the time of its attempted recollection, particularly that component of the conditions that we refer to as retrieval information...what a person recollects about an experience is not determined by the memory trace of that experience. The memory trace is only one important co-determinate of recollection; the other equally important one is the retrieval information that is used in the process of actualizing the trace (Tulving, 1983, p. 4-5).

Indeed, it is very common to find in education literature today the supposition that retrieval accuracy increases as the retrieval environment more closely approximates that of the encoding environment. The statement is so common that it appears often without support or reference to literature, as though it were agreed upon by all. There are some experiments which bear out this supposition.

In the 1970's Godden and Baddeley (1975) did some fairly light-weight research with memory tasks performed underwater (one suspects a coupling of business with pleasure). They concluded that the memory retrieval environment did significantly affect a person's ability to remember. Cann and Ross (1989), as well as Schab (1990), found that memory retrieval was significantly improved by having the smells at time of encoding present in the retrieval environment as well. Seemingly, if you study with the smell of chocolate in the air, you should try to remember the information with the smell of chocolate in the air. Smith (1985) found that music had much the same effect; those with similar musical backgrounds at time of encoding and retrieval remembered more than those who did not have such cues to access. Over the years, state-dependent and context-dependent researchers have shown that music, smells, and traits of the physical environment all provide cues that help people remember, if those cues are produced at the time of retrieval.

So, what is the point of all this? The point is that Johnny may not do well on tests because his brain is operating exactly as educational theorists and experimenters propose. His performance on tests might improve if the tests he was asked to take more closely referenced his encoding environments. Every sound, smell, touch, spatial orientation, and image Johnny relied on to remember has been stripped out, with one exception. The text representation of the knowledge has been retained. Is the text representation of his rich learning environment sufficient for him to remember? (And here is the real point.) We aren't sure. After all the theories and all the experimentation has been examined, the fact remains that this question has very little pertinent experimentation one can reference. Designing the experiments necessary to answer this question would have been all but impossible until just a few years ago. Now, however, it is possible to design and implement experiments which would provide real answers to this question instead of relying upon unsubstantiated theoretical frameworks. An accurate assessment of student learning is too important to rest upon guesswork. Practitioners and researchers in the field need to investigate and find real answers. If student achievement changes with test modality then the surety with which we treat standardized test results is a sham and a disservice to the students and parents we are attempting to help.

Changing Assessment, continued

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About the Author

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Adopting & Implementing Blackboard at a Virginia Middle School

by Nancy Hoskins

Blackboard, a Web-based learning management system, allows teachers to post course materials, email students, conduct asynchronous and synchronous discussions. It also allows students to transfer documents between school and home as well submit assignments online. Although this tool can be used to teach a course entirely online, as is the case with Fairfax County Public Schools' (FCPS) online campus, FCPS 24-7 Learning, Blackboard is used primarily as a communication tool to extend learning beyond the traditional school day.

As with anything new, adoption of a new technology does not happen seamlessly. Unless change is mandated or dramatic benefit is demonstrated, most teachers are resistant. At Poe Middle School we are in year four of a slow but steady adoption of Blackboard. During the 2002-2003 school year, after providing Blackboard training to the Vanguard committee (a group of teachers who plan for and implement training for technology integration), the principal was asked to establish a minimum use requirement for Blackboard and have Vanguard team members provide the necessary staff training. Because of other school-wide initiatives, she preferred that Blackboard not be required, but that its use be spread in a grassroots fashion.

Challenged with implementing Blackboard at the grassroots level, we developed two Blackboard sites, Poe Staff Technology and International Baccalaureate Middle Years Program (IB-MYP), that focused on introducing the strengths of the application as a central location for sharing resources. An information management system (IMS) requires all teachers to use the IGPro gradebook and the ClassXP attendance program. Poe Middle School became an IMS school in September 2003. The Poe Staff Technology site became the vehicle for sharing IMS "Frequently Asked Questions" and quick reference sheets. Also during the 2003 school year, Poe MS was adopting the baccalaureate program. The IB-MYP site, developed by Pam Morgan, Poe's IB-MYP coordinator and a Vanguard Team member, served as a repository of MYP resources.

Simply creating and maintaining these sites did little to achieve the goal of introducing teachers to the resource-sharing benefits of Blackboard.

Adopting Blackboard, continued

Teachers needed both initial training and ongoing encouragement. Early in the second semester, IMS issues, specifically issues with the IGPro second-quarter grade-exports, necessitated a meeting with the entire faculty. At grade level department meetings, teachers were shown how to access the IMS resources in Poe Staff Technology. Shortly thereafter, staff was introduced to the IB-MYP organization and its valuable resources, reinforcing the idea that Blackboard is a viable vehicle for sharing material with staff and/or students. Both sites were maintained with quality and timely materials; as staff members requested IMS or IB-MYP information, they were consistently referred to the Blackboard sites to access the material.

As the staff became aware of Blackboard through the Poe Staff Technology course and the IB-MYP Organization, a core group of teachers was trained to use Blackboard as instructors. Formal Blackboard training of new Vanguard team members took place early second quarter during two half-day sessions. Individual members began to plan how they would use Blackboard with their students. Debbie Anderson, eighth grade math teacher, math department chair, and Vanguard team member, decided that eighth grade math teachers would systematically use Blackboard to post homework. Catherine Hawkins, seventh grade math teacher and Vanguard team member, believing this to be a good idea, presented the idea to the seventh grade teachers. A letter was sent (see appendix A) to all Poe MS parents introducing the FCPS 24-7 Learning site, through which they can access Blackboard. Math teachers were trained and built their sites. All eighth grade students were taken to the lab to access the site, change their passwords, and learn how to access their homework assignments. A second letter was sent to parents sharing their student's ID and password, thus providing them with Blackboard access. One of the three eighth grade teams then decided that the entire team should be using Blackboard to post homework. Momentum for Blackboard was spreading through the eighth grade.

During the 2003-2004 school year, staff members had a professional obligation to attend a seven hour/195th day of training outside of school time. With the approval of June Monterio, our principal, application was made to our cluster director for permission to teach a 3.5 hour 195th[1] day Blackboard Basics session for interested staff members. At a subsequent faculty meeting the staff was introduced to two additional features of Blackboard, the discussion board and a survey creation tool. The teacher-generated discussion board question pertained to students turning in late-work and the impact this had on meeting final grade export deadlines. Teachers were encouraged to visit the site and contribute their thoughts on how to teach student accountability. The survey was to gather data regarding teachers' use and perceptions of various tools for communicating with parents, their knowledge and use of Blackboard, and their technology skills. How to access and complete the survey was demonstrated at the faculty meeting. As an incentive for completing the survey, teachers were prom-

1. 195th day is a name given to the training obligation because it was a day added to the teacher's contract length. The teacher contract is now 195 days.

Adopting Blackboard, continued

ised a reward[2]. Staff members were informed of the 195th day training and encouraged to sign up for training through email. There was sufficient interest to conduct two sessions. Momentum was growing throughout the school.

Additional opportunities for training were afforded us through a mentor/protégé program and the Teachers As Researchers program, each of which provided funds for substitutes. When offered a half day of sub coverage to build their site, eight teachers, the librarian, the LD department chair, and a guidance counselor participated. A number of other teachers expressed interest, requesting that additional sub time be provided.

Although at the end of the 2003-2004 school year the majority of teachers were not yet using Blackboard with their students, many made the initial leap, and all teachers were aware that they had accounts and had been introduced to many of Blackboard's features and benefits. Individual teachers asked for training. For example, an English as Second Language Teacher (ESOL) teacher wanted to know how to use the digital drop box. Once trained, she used it with her students when they were completing a PowerPoint project to provide secure storage for their documents between work sessions. Later in the school year, when teachers were asked how they were using Blackboard and if they felt it was effective, this is what Candace (the ESOL teacher) said:

> I'm using the Digital Drop Box in Blackboard with all of my ESOL B2 classes. This is a good way for students to save files in a secure location and to send them to me. Blackboard is relatively effective for this purpose. ...
>
> I have also presented PowerPoint shows in class …and then posted them in Blackboard so students can review this information on their own. In addition, I have developed several activities practicing parts of speech that I posted to Blackboard so students can practice on their own. Blackboard is (theoretically) very effective for these purposes. Unfortunately, I don't think most of my students are actually accessing this information.
>
> Since many of my students do not have access to the Internet at home, I do not post assignments in Blackboard.
>
> I'm likely to use Blackboard in the future for these purposes.

Many teachers voluntarily used Blackboard to post homework, others used the digital drop box, and still others explored the use of the discussion board during the 2003-2004 school year. However, many of our teachers believed that too few of our students have Internet access from home, making it pointless to post homework assignments. To determine the accuracy of these perceptions, teachers were asked:

2. The reward, a Hershey candy bar, was wrapped in a "Technology Nutrition Label" (see Appendix B) and placed in the teacher's mailbox when the survey was completed.

Adopting Blackboard, continued

What percentage of your students do you think have reliable Internet access at home? Teachers answered:

Less than 25%	11%
Between 25% and 50%	39%
Between 50% and 75%	42%
More than 75%	8%

Students were asked a similar question:

Other than at school, where do you access the Internet? Students responded:

At home	80%
At a friend's house	19%
At the library	16%
I don't use the Internet outside of school.	3%

The implications of this very powerful piece of information seem clear. With such a high percentage of students having convenient access to the Internet, there is a tremendous opportunity to use Blackboard to improve communication. If used effectively by teachers, administrators, students and parents, Blackboard may help to increase parent involvement.

At our final faculty meeting in June, this survey finding was presented to the faculty in a PowerPoint presentation that featured teachers stating how they currently use Blackboard and their plans for future use. Seeing the multitude of possible benefits, and encouraged by the cluster director, our principal, referring to the PowerPoint presentation, announced her decision to require all teachers to post homework assignments in Blackboard in 2004-2005.

Progress continues this year. Parents were introduced to Blackboard with a letter included in the opening of school packet, through a flyer at back-to-school night, and through a letter providing their child's user ID and password. Teachers participated in a 90 minute Blackboard training session during the first week of school. Additional training has been provided through FCPS academy classes and is ongoing in the form of optional need-specific individual and group sessions. During the initial training, the navigation bar for all Poe MS courses was standardized to simplify navigation for parents. Teachers enrolled administrators and guidance counselors in their classes, both for the enrollment training and for the benefit of the administrators and guidance counselors. Teachers were also shown how to make classes available and how to post homework. They were charged with having their classes available by the end of September and with posting updated homework assignments once a week.

Adopting Blackboard, continued

In September, English teachers were to see that all students accessed their Blackboard account and changed their password. Letters with the student's password were to be sent home to parents. The majority of teachers accomplished this task; however, there are many students who still have not accessed their accounts, resulting in frustration for many students and teachers. To resolve this issue, the school's student TV station is preparing a public service announcement explaining how to log into Blackboard, change the password, and navigate the application. Over the course of a week TA[3] teachers will have all students check to assure that they can login to Blackboard and that they have changed their password. Passwords will be recorded in a spreadsheet and shared with the student's teachers. A letter will again be sent to parents reinforcing the value of Blackboard and providing access to their child's account.

Additional uses of Blackboard at Poe MS include an administrative site sharing information with the staff (e.g., the school's master calendar), curriculum sites for collaboration and sharing content-specific information and lesson plans, and a library site providing access to the school's subscription databases, pathfinders, and the digital drop box for all staff and students.

Much progress has been made. Although most teachers are only fulfilling their minimum requirement and a number have chosen to ignore the requirement, still others are going beyond the minimum by using the digital drop box and posting resources and documents. With any new technology, full adoption will take time. As teachers observe instructional benefits and improved student and parent communication experienced by their colleagues, they will gradually adopt this tool. Blackboard is not a one-size-fits-all tool, but as teachers begin to embrace it, they will find the best fit for themselves and their students.

About the Author

Nancy Hoskins, an educator for 27 years, is currently a school-based technology specialist with Fairfax County Public Schools, Va. She began her career as a Home Economics teacher in western Pennsylvania, has a master's degree in Secondary School Mathematics from Western Maryland College, and has been with FCPS for 14 years. She became involved with Teacher Research as an SBTS in 2003. She can be reached at: Nancy.Hoskins@fcps.edu

3. TA is a 30 minute class period similar to homeroom.

Adopting Blackboard, Appendix A *(N. Hoskins)*

Letter to Parents

[SCHOOL LETTERHEAD]

Dear Parent,

You may have heard of FCPS 24-7 Learning or Blackboard and wonder how your student at Poe Middle School will use it. I hope your questions will be answered by this letter.

What is FCPS 24-7 Learning or Blackboard?
Fairfax County Public Schools, FCPS, has provided a Blackboard account to each student. This is an online tool that allows FCPS to extend learning beyond the traditional school day and beyond school buildings by allowing students to see homework, classroom assignments, resources, and much more from home.

When will my child begin to use Blackboard?
Every student has been given an account to use Blackboard. In order for the account to be active, one or more of your child's teachers must be using it. (Until at least one of your child's teachers uses Blackboard, your child will not use it.)

How will my child use Blackboard?
When a teacher begins to use Blackboard, students will be taken into a computer lab and taught how to use it. During the introduction, students will learn about how to login from any Internet location. They will be given a login ID and a password. This login and password, which will be sent to you at that time via U.S. mail, will allow you and your child to access the information from any Internet location.

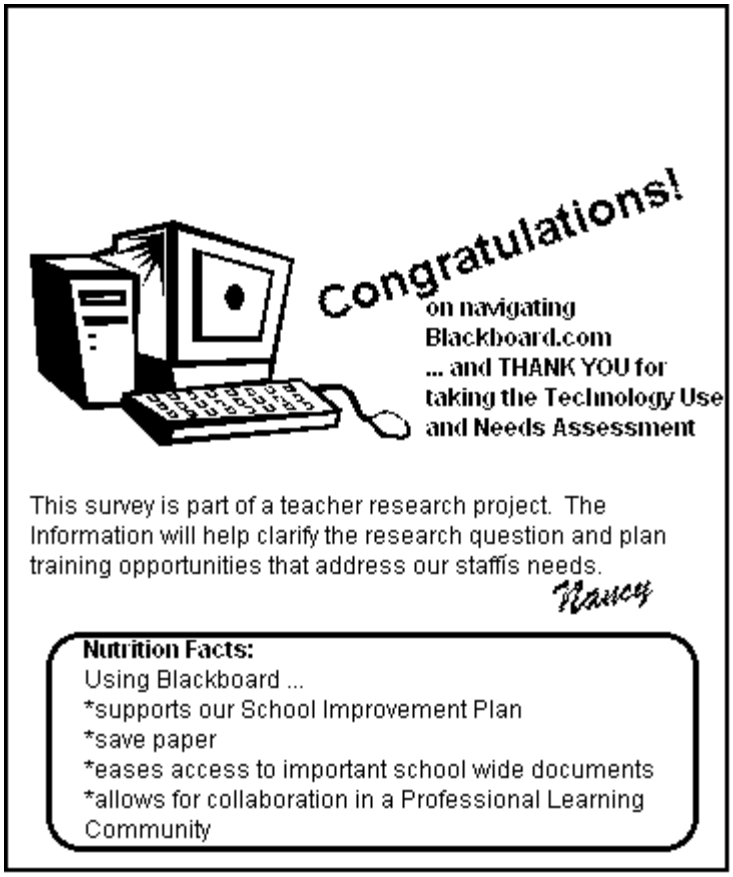
How soon will this start?
At this time the use of FCPS 24-7 Learning (Blackboard.com) is optional at Poe.
Teachers are receiving training on the use of FCPS 24-7 Learning. As teachers begin to use this product they will introduce the program to students in a lab setting. *(Public internet access is possible at George Mason Regional Library).* The address is http://fcps.blackboard.com . A link to FCPS 24-7 Learning is also found on both the FCPS home page http://www.fcps.edu and Poe Middle School's home page http://www.fcps.edu/PoeMS.

Sincerely,

June Monterio, Principal
Nancy Hoskins, School-Based Technology Specialist
Poe MS Technology Vanguard Committee

Adopting Blackboard, Appendix B *(N. Hoskins)*

Candy wrapper



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Infusing Technology into any Instructional Program

"5W / 5E"

by Wanda Walters

Author's note: The goal of this article is to illustrate that by combining the 5W's with the 5E's, an instructional planning tool emerges that allows teachers to easily, seamlessly, and efficiently infuse technology into any instructional program. The strategies presented are appropriate for all grade levels and content areas.

You may be wondering, "Why yet another technology integration tool?" The CEO Forum, *School Technology and Readiness Report* (2001) states that technology can have the greatest impact when integrated into the curriculum to achieve clear, measurable educational goals. Certainly, school districts have embraced this position as evidenced by the infusion of instructional technology resources that are currently available. Within the last twenty years, it is now commonplace to see in educational settings productivity software that includes word processing, spreadsheet creation, email, database, multimedia, and Internet browsing. These resources are all acquired with the implicit objective to further support student understanding and increase achievement of educational objectives

The requirement of high-stakes mandatory state testing, the federal No Child Left Behind Act (NCLB), time constraints, and training issues have teachers struggling to integrate the abundance of available technologies into their instructional day. It is still not unusual to walk through many schools and see state-of-the-art computers being underutilized and the supporting resources sitting idly on shelves collecting dust. Many teachers are often so overwhelmed by the magnitude of all that is required of them that they cannot conceive where to begin to "add another thing." Too often they simply elect not to use the invaluable technological tools that are available to the detriment of today's students who are very attuned to learning in such a modality. Teachers rationalize the under-use of instructional technology with comments like, "People have been educated without technology for centuries."

While most educators are comfortable using word processing and email for their own productivity, the real technology challenge for most teachers is incorporating a strategy to effectively and meaningfully integrate all of their available technologies into their instructional program to bolster student achievement.

5W / 5E, continued

For those teachers who want to use technology in their program, there is that ever pressing question, should instruction drive technology or vice versa? Should a teacher examine his instructional goals and then determine the technology, or does one look at the available technology and then decide how to apply into the instructional program? Are there times when both approaches are appropriate? As teachers use the 5W/5E planning tool, it becomes apparent that the instructional goal must be the foremost consideration when applying instructional technology.

The 5W/5E model

We are all familiar with the 5W's: Who, What, Where, When, and Why. We begin by asking the 5 W's as they apply to curriculum and integrated technology.

Who?

Who is being targeted for the integration of technology?

- Whole group?
- Flexible group?
- Students with differentiated needs?

What?

What is the instructional goal?
What technologies are available?
What technologies would the educator like to use?

Where?

Where will the technology be delivered?

- In the classroom using a teacher presentation system?
- In the classroom computer center?
- In the computer lab?
- With resource/peer support?

When?

When will the technology integration take place?

- As a warm-up or wrap-up activity?
- After a particular lesson?

What is the timeline?

Why?

The most important question that the teacher needs to ask herself is, "Why am I using technology?"

5W / 5E, continued

Let me cite an example of the value of teachers being able to articulate their reason for using instructional technology. As a technology trainer, I was listening to one of our very fine teachers sharing an integrated technology lesson that she developed. When asked why she designed that lesson, she looked quizzically and responded, "Because we were told to develop a lesson using technology for our next assignment." After listening to my 5W/5E presentation, she remarked, "Now I know why I developed that lesson, I wanted to evaluate my students understanding of the social studies vocabulary….thanks for giving me the words." I feel as though this teacher was pleasantly reminded that she did in fact have an educational purpose before she had a technology goal.

Why is the teacher using technology to address educational objectives?

To answer this question, we'll use the Biological Science Curriculum Study's (2004) "5E model." This model emphasizes engagement, exploration, explanation, elaboration, and evaluation.

Engage

Is the goal to engage students in the topic? For example, a teacher may use an interactive website as a warm-up activity to begin a unit on fractions, and then continue the lesson with manipulatives and/or text resources .

Explore

Is the goal to provide the students the opportunity to further explore the concept? An instructor may assign students a particular CD ROM or website, or she may utilize designated templates.

Explain

How about using technology to explain an objective? Technology may be used to further clarify the concept and define relevant vocabulary.

Elaborate

Could the most appropriate use of technology be to provide students with the opportunity to elaborate and build on their understanding of the concept by applying it to new situations? This is especially true when it is evident that students have already mastered a particular baseline goal and are in need of a more differentiated, higher-level thinking, educationally-related experience.

Evaluate

Finally, would the teacher's intent be to assign students technology based activities that will help them and the teacher to evaluate their understanding of the concept? For example, a teacher may direct students to open a paint program and show her that that they understand that 9 divided by 12 equals 75%.

5W / 5E, continued

Using Biological Sciences Curriculum Study's (2004) 5E constructivist model, teachers are better able to articulate their educational purpose for their selection and defend the appropriateness of the chosen technology. Another advantage of incorporating the use of the 5E model is best summarized by Moersch (2002), who says, "The 5E model provides teachers with a simple formula for designing quality experiential instructional units without the need to study brain hemispheres, research elaborate pedagogical theories, or pay consultants healthy ransoms to part with their personal models" (p. 101).

The 5-E model is based on a constructivist approach of learning (Trowbridge & Bybee, 1990). The theory of constructivism encourages educators to focus on making connections between facts that are required and tailoring instructional strategies that allow students to actively construct meaning and foster understanding of objectives. Effective use of technology is the perfect instrument to achieve this goal.

During the past year, I have discussed the 5W/5E concept with countless colleagues and the response has been virtually unanimous: "This makes so much sense," "It is so logical, understandable and doable." Many School Based Technology Specialists (SBTS) with whom I have had the pleasure of working are planning to use the 5W/5E framework to organize technological resources for their teachers during the upcoming school year. The appendix includes an outline and sample of how to use the 5W/5E Technology Integration Tool. The next time you are planning to use technology within your instructional program, try using the 5W/5E model.

Many resources used in the examples are web-based and can be found at the free bookmarking website, Portaportal (see "Article Resource Links").

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5W / 5E, continued

Article Resource Links

Biological Sciences Curriculum Study: http://www.bscs.org

Examples on Portaportal (guest id = solmath): http://www.portaportal.com

About the Author

Wanda Walters is currently an FCPS Instructional Technology Project Manager. She was an elementary classroom teacher for seventeen years in Fairfax County Public Schools, Fairfax, Va. In 1991, Ms. Walters served in the newly created position of science/technology resource teacher at the central level with primary responsibilities to facilitate the seamless integration of technology into the elementary science curriculum and assist with the planning, designing, and teacher training in the use of basic technology productivity skills. For over a decade, Ms. Walters was also an FCPS instructional technology trainer for enterprise initiatives. Ms. Walters can be contacted at Wanda.Walters@fcps.edu.

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5W / 5E, Appendix A *(W. Walters)*

5W / 5E Planning Tool Outline

What are you teaching (instructional goals…e.g., specific educational objectives);

What are the available technological resources?

What resources would you like to use?
For example:
Templates
Specific titled CD ROMs
Productivity Software
- Microsoft office suite™ (Word, PPT, Excel), AppleWorks™, etc.
- Kidspiration/Inspiration™
- Response System Technologly (e.g., LearnStar, Qwizdom)

Windows On Science™ (can be used across the curriculum)
Resources identified in the FCPS 24/7 online Instructional Gateways
Other

Who (Targeted Audience)

For example:
Whole Group
Flexible Groups
Rotation Teams
Students with Differentiated Needs (e.g., special ed, ESOL, GT, etc)
Other

When:
After examining the curriculum guides, text books, manipulates, etc…plan where the technology integration will best fit.

Establish timelines

Why are you using integrated technology with the targeted population**?**

Engage
Explore
Explain
Elaborate
Evaluate

Where/How will the technology infusion take place to address the instructional objective(s)?

Teacher using presentation system
Classroom computer center using rotation system
Computer Lab
With Parent Aide
With Peer Tutor
Other

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5W / 5E, Appendix B *(W. Walters)*

Sample 5W/5E Technology Integration Model

(Virginia Standard of Learning - SOL 5.2a)

Grade: 5 **Content Area:** Math

What is your instructional goal (e.g., Standards of Learning objective)?

POS objective NCT 5 and NCT 6/ SOL Objective 5.2 - The student will:

1. recognize and name commonly used fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal form and vice versa; and
2. order a given set of fractions and decimals from least to greatest. Fractions will include like and unlike denominators limited to 12 or less, and mixed numbers.

Sample	A	B	C	D
WHO	Whole Group	Special Needs Inclusion Student	Whole group	Students who may already understand the correlation between fractions
WHY	Engage and Explore	Explore (Matching halves)	Elaborate	Evaluate
WHAT	Website http://illuminations.nctm.org/mathlets/fractionpie/index.html	Website http://www.abc.net.au/countusin/games/game13.htm	Website (recipe using fractions)… http://mathforum.org/paths/fractions/frac.recipe.html	Using a Paint program, show me you understand that 9 divided by 12 = 75%
WHEN	Demo/Warm-up at the beginning of lesson	While others are working at their desks	After we complete page XYZ Tuesday Morning	Rotation during Center Time
WHERE	Using teacher presentation station	Resource Staff/Parent Aide/Peer Tutor	In the pod area and make the recipe in teams	Classroom

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5W / 5E, Appendix C *(W. Walters)*

5W / 5E Planning for Technology Integration Template

Grade_____ Content Area_____

What is your instructional goal (e.g., Standards of Learning objective)?

Who: Who is your targeted audience? Whole group? Flexible group? Inclusion student? G&T student? Other?

Why: For more information log on to *http://www.bscs.org* [Engage, Explore, Explain, Elaborate, Evaluate]

What: What resources are available to you? What resources would you like to use?

When: When are you going to integrate the technology into your instruction? Demo at beginning of lesson? After xyz page? After using xyz manipulates? Other?

Where: Where will the technology infusion take place? Classroom Demo from Teacher Presentation Station? Computer Lab? With Special Ed Resource Teacher? Peer Tutor? Computer Station in Classroom? Other?

WHO	
WHY	
WHAT	
WHEN	
WHERE	

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Universal Design for Learning: Assuring Access & Success for All

by Fran Smith, Ed.S., & Pamela Leconte, Ed.D.

The design of curricula and learning environments that can meet the needs of all learners is a challenge. Attempts are often made to retrofit a situation or environment. These efforts to restructure or adapt often fall short of offering a more holistic solution – one that does not single out a particular student as being different or needing extra teacher effort. Over the past decade, a number of discussions have opened the door for a new look at how educators can reach diverse learners. Researchers have demonstrated the effectiveness of utilizing technologies and instructional approaches that can enrich the educational experience for a myriad of learner approaches.

Universal Design for Learning (UDL) is an emerging approach for teaching diverse learners through focusing on more flexible applications of technologies, instructional networks and manipulation of digital content (CAST, 2003). Rose and Meyer (2000) note that through electronic PET scan studies of the brain, researchers have proven that each of us receives information and learns very differently – depending upon the activity in which we are engaged. This "modularized" learning approach of our brains further supports the importance for educators to reevaluate traditional instructional and classroom approaches. According to Rose and Meyer (2002), teaching that is designed to reach all learners should be planned around three guiding principles: (a) providing multiple representations of information, (b) providing multiple pathways for expression and, (c) providing multiple opportunities for engagement. When recognizing these principles, instruction is provided in a manner that complements the multiple and unique ways in which we all learn.

The communications technology revolution, digital systems, brain research, multiple intelligence theories (Gardner, 1983; Sternberg, 1996), *and* the civil rights movement of persons with disabilities (e.g., non-discrimination statutes such as the Rehabilitation Act of 1973 as amended , the Americans with Disabilities Act of 1990, and the series of special education laws, now known as the Individuals

Universal Design, continued

with Disabilities Education Act of 1997, have merged to create a new era in the UDL educational approach that meets the needs of all learners without pointing out their differences. It is what Rose and Meyer (2002) call the "intersection of initiatives" (p. 7). They say that our educational initiatives of integrated units, multiple intelligences, multi-sensory teaching, differentiated instruction, performance-based assessments, and computers in schools, digital media, web-based media, and others combine to support and form a rich UDL approach.

The Challenge of Meeting Multiple Needs and Styles

Buckminster Fuller, a multi-talented innovator of the 20th Century, contributed to society as a scientist, engineer, inventor (left hemisphere/brain dominance) and as a philosopher, psychologist, and essayist (right hemisphere/brain dominance). As with many inventors and leaders, the multi-faceted dimensions that defined these individuals contributed to their successes. Yet, in traditional academic environments, indeed in current ones (which are defined by rigorous standards, high-stakes assessments, and accountability for all), these preeminent leaders of innovation may have failed to become recognized for their talents or contributions. Einstein, who was labeled a failure by his grade school math teachers, proceeded to change how we view and operate in our world despite his limitations. The educational system did not know how to accommodate his way of learning, yet he excelled in spite of the failures of public education. In today's educational climate, many potential Fullers and Einsteins may be experiencing the same failures of our system. This is often true of students who learn differently than how they are taught, including students with disabilities.

Universal Design for Learning requires that instruction and assessment approaches are flexible enough to automatically include alternatives, making them accessible and appropriate for individuals with diverse backgrounds, varied learning approaches, abilities, and disabilities. Maximizing the use of digital media is a central premise of the UDL philosophy. UDL "draws upon a student's strengths and interests which may be blocked by the exclusive use of printed text" and offers a myriad of instructional options that capitalize upon digital formats (Rose & Meyer, 2002, p. 7). Applying a UDL approach offers multiple options and approaches that support the understanding that intelligence is not just defined by a single test score but rather "defined as the ability to solve problems or to create products that are valued" (Gardner, 1983, p.).

What Millennium Teachers Should Know

The No Child Left Behind Act (NCLB) (2001) and Individuals with Disabilities Act (IDEA) (1997) require special education and general education teachers to collaborate to enhance student success. The intent of this collaboration is to ensure that

Universal Design, continued

students with disabilities receive instruction in the most appropriate educational setting. One significant result of incorporating Universal Design for Learning strategies in education is that *all* students, with or without disabilities, can benefit from the variety of teaching methods employed. Through a UDL framework, educators can

1. learn to identify student strengths, needs, and preferences through brain networks (soon teachers will be able to read and interpret PET scans to understand brain functions of certain learners),

2. adjust for curriculum/classroom barriers by maximizing multiple options for expression and engagement (using assistive technologies such as speech recognition software, talking word processors, screen readers, and tactile graphic pads), and

3. recognize benefits from the use of technologies that can provide multiple representation of format.

For example, one student may excel when he reads material that is simultaneously spoken aloud and visually highlighted by word and sentence while another may "come alive" through small group discussions and opportunities to demonstrate learned material. Educators need not be experts in using the vast array of assistive technology devices and services, but they should be aware of how they and their students can access them—as well as where to receive targeted training.

Basic UDL Skills for Today's Educators

Universal Design for Learning supports a philosophy of incorporating a wide variety of technology and instructional approaches to reach all students. Through the core concept of universal design for learning ("anything that is accessible to some needs to be accessible to all"), millennium teachers must have opportunities to learn and apply computer technology, web access, and digitized curricula to their classrooms. Curriculum can include digital and online resources rather than print-based textbooks (Rose & Meyer, 2000), requiring that educators know how to locate digital content as well as create it. Also, teachers and/or support personnel should have access to and know how to operate digital video cameras, scanners, and have the ability to manipulate digital text, images, audio, video, and networks (Rose & Meyer, 2000). By acquiring these skills (which teacher preparation programs should provide), educators can transform media from one form to others and thus can foster student learning by using text-to-speech, speech-to-text, image-to-touch (e.g., tactile graphics), text-on-video, graphics-on-video (e.g., signed captioning for students who are deaf or have a certain learning disability), sound maps, etc. (Rose & Meyer, 2000). With these and other options for learning, teachers can be creative and students can access and demonstrate their learning.

Instructional settings that are enriched through principles and practices of uni-

Universal Design, continued

versal design for learning show great promise - especially for students with special needs and teachers with diverse approaches. In addition, the multitude of "assistive" technologies that are incorporated into mainstream hardware and software also offer equally effective resources for all users. It is vital that more widespread efforts be made to ensure that teachers in both special and regular education have access to this important information on how to incorporate learning methods, technologies, and strategies to reach *all* learners.

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