Technology and Early Literacy: A Recipe for Success

By Dara Feldman

Young children are eager to learn, willing to take risks, and highly capable of using technology to explore, create, communicate and collaborate. Using computers is a hands on approach that reaches all learning styles. It improves self esteem, increases motivation, decreases discipline problems, encourages cooperative learning and problem solving, and brings opportunities to students to interact with things they may never in their lives get a chance to do in a real life setting. Computers appeal to a child's imagination and natural curiosity, and taking advantage of this curiosity can provide many opportunities for learning. If early childhood students are given appropriate opportunities to utilize technology as a tool for reading, writing, and collaboration, it will help them to develop a foundation for life long learning.

In March of 1997, the Report to the President on the Use of Technology to Strengthen K-12 Education in the United States was published by the President’s Committee of Advisors on Science and Technology’s Panel on Educational Technology. For technology to make an impact in schools the panel spelled out the following six specific strategic recommendations:

1. **Focus on learning with technology, not about technology.**
2. **Emphasize content and pedagogy, and not just hardware.**
3. **Give special attention to professional development.**
4. **Engage in realistic budgeting.**
5. **Ensure equitable, universal access.**
6. **Initiate a major program of experimental research.**

**Focus on learning with technology, not about technology.** Technology should be fully integrated into the classroom and be used as a tool for learning “to improve the quality of education in all subject areas (Expert Panel 1997).” “In the literature in education there has long been a pervasive tendency to assume that reading is the principal route to knowledge for students (Papert 1993).” In Papert’s book, The Children’s Machine, he addressed how children were at risk because letteracy and literacy were virtually synonymous. He was years ahead in identifying that to reform elementary education, the movement from letteracy to media-based knowledge acquisition may be even more important than the movement from preletterate to letterate culture. Just as Papert stated 6 years earlier, the October 1999 issue of Educational Leadership is devoted to the call for redefining literacy and states that literacy needs to include print and electronic literacy. "Students read and interpret not just words on a page, but also icons on a computer.
screen, images on TV, and graphs and charts in newspapers. "We are living in the information and communication age, but our PreK-3 classrooms and teaching do not yet reflect and employ the tools and resources of today's world. It is our responsibility as parents and educators to provide our children with the best foundation for life long learning and to equip our schools with not only tools for today, but tools for tomorrow.

During the last century, schools were typically structured around behaviorist learning theory in which teaching was telling and learning was memorizing. Today, the constructivist view incorporates the importance of learning basic skills but explains that “advanced skills of comprehension, reasoning, composition, and experimentation are acquired not through the transmission of facts but through the learner’s interaction with content. This approach takes advantage of a student’s natural ability to learn through experience and to “create mental structures which organize and synthesize the information and experiences which the individual encounters in the world. Information and communication technologies such as the Internet support this approach to teaching and learning, which encourages learning in authentic contexts, collaboration and external supports, and use of multiple primary source material and resources as well as textbooks (Fulton 1997).”

In addition to the paradigm shift in classroom instruction from the teacher’s role as “sage on stage” to the “guide on the side”, technology proves to be a tool that “educational innovators” (Papert 1993) such as Dewey, Friere, Piaget and Vygotsky would embrace.

John Dewey’s idea that children would learn better if learning were truly a part of living experience (Papert 1993) can be seen when examining the use of the Internet with students. "The Internet provides opportunities for collaborative learning projects that could not exist any other way. Through such projects our students can collaborate with students in other classrooms around the globe on a common endeavor (Dionisio 1999).” Online book clubs helps students expand their literary conversations. Students can learn about a favorite author and in some cases, communicate with him or her through email and/or video conferencing. Using the Internet to take virtual field trips allow students to travel beyond the classroom walls without actually leaving. It gives them the opportunity to learn about different cultures, appreciate diversity, and extend their background information. Email and websites give students authentic purposes and audiences for reading and writing. Additionally, digital images allow students to record & document their experiences. These images encourage reflection and provide a springboard for discussion and writing.
When observing the control of learning that young children have while using developmentally appropriate multimedia, Friere’s idea that children would learn better if they were truly in charge of their own learning processes (Papert 1993) is illuminated. Computer technology allows for a more individualized approach to learning. Much of the software lets the students progress and learn at their own pace, and teachers become more like facilitators and coaches who tailor their assistance to the needs of the child (Guthrie and Richardson 1995).

Technology can empower young children to communicate their thoughts and feelings. The ease of composing, revising, and extending encourages young writers to develop their compositions and produce their best work. With traditional tools, such as handwriting and typewriters, writers often avoid improving their compositions because of the tedium of re-copying (Daiute 1985). “For some students pressing a button is easier than manipulating a blunt stick of wood (Jankowski 1998).” We have often heard the anecdote about the child who was a two line story person, but when he got to use a computer he wrote a page on his first attempt. In other words, he was always able to write a page, he just did not have the right tool. Technology can be the right tool for supporting blooming authors.

Computers and peer tutoring enable children to write before they can spell with a pencil. "Computers are not just a tool, they are also a means for expression and in this way encourage independent thought and effort (Jankowski 1998). Teachers report computers enable students to write more and higher quality stories. Children are willing to proofread their computer written work. Additionally, the ability to include quality pictures into their writing has proven to be highly motivating.

"Using technology for shared writing allows students to see their words woven into the tapestry of the entire class’ ideas, printed out, and posted on the wall which provides an important feeling of public accomplishment that all students can share (Guthrie and Richardson 1995).” "When writing to an audience of their peers, students often spend more time writing, editing, and polishing their work. Through the WWW, students can take that concept of writing for their peers to the next level-the world! While we often publicize students who win awards for essays or creative writing, the Web opens up the opportunity for all students to see their work in print (Repman 1998). "

**Emphasize content and pedagogy, and not just hardware.** The use of technology should be based on the instructional objective(s) being taught and should add value to the instructional experience. Using developmentally appropriate digital content (software and Internet resources) that support the instructional objective(s )will provide opportunities for developing higher-order reasoning and problem solving skills.

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One key to technology’s effectiveness is its interactive quality, so students can get involved with the content as they manipulate the media (Farmer 1998). Multimedia allows the user to proceed as a function of his or her interest, prior knowledge, and reading ability (Hubert 1997). Children have more control over their learning. Research on early reading development supports the effectiveness of the simultaneous presentation of written words and sounds for helping children’s decoding skills. “Several studies confirm that the combination of text with pictures, video, and sound help children and adults to better comprehend and remember the text materials if the images illustrate the information and relate to the users’ knowledge, skills, and abilities (Herring-Harris 1996)."

One form of multimedia that can have many benefits to young readers is electronic books. Electronic books provide a wealth of opportunities for language acquisition and appeal to students of all multiple intelligences. Using an electronic book combines reading, writing, listening, and speaking as part of the development of the children's literacy skills. They help students in decoding by presenting written information and spoken words simultaneously. E-books support comprehension by combining words with related pictures, sounds, and video. Recording capabilities and text to speech technology gives students the opportunity for self monitoring and provides them with immediate feedback. Using electronic books enhances memory skills by presenting written and spoken words at the same time. They help readers construct mental models for information. They also allow emergent readers to follow along with a story even if they cannot read the text independently, by highlighting words as they are read aloud.

Appropriate technology use can help develop and strengthen children's literacy and social skills. Lev Vygotsky’s idea that conversations play a crucial role in learning can be seen when observing children working cooperatively at the same computer. Research has shown that students engage in conversation more when they are working on the computer than when they are using other learning tools such as blocks, paint, paper, and pencils.

The use of technology facilitates differentiation based on performance level as well as interest. This supports Jean Piaget’s idea that intelligence emerges from an evolutionary process in which many factors must have time to find their equilibrium (Papert 1993). Multimedia applications can provide scaffolding and support to young readers by offering audio word lists and text to speech capabilities. "One of the most potentially consequential advantages for early reading instruction is that the computer has the capability of flexibly linking synthesized or digitized speech with typed text. I find it remarkable that people in our field have not recognized and explored systematically the tremendous pedagogical implications of a technology that can provide readers upon demand with audible pronunciation of a word
that is unfamiliar during independent reading (Not to mention a wide range of other useful assistance) (Reinking 1997).

Developmentally appropriate software helps provide differentiation, allows students to work at their own pace, and guides children to success. Quality software provides a variety of ways to support reluctant readers and remedial readers without endless phonics drills and basal readers (Herring-Harris 1996). Applications can include tutorials for enrichment, extension or remediation. Multimedia applications can also support students creating their own books and teachers creating leveled texts to directly support their curriculum. Several CDs make accommodations for different languages and allow students to hear directions in their native language but require them to read the stories and do word work in English.

Additionally, the World Wide Web makes different types and levels of reading materials more accessible to students. By copying and pasting text from the Web into a word processing program, adaptations can easily be created to make accommodations for individual children. Text size can be increased for students with visual impairments. Vocabulary can be simplified for emerging readers. Key words and concepts can be highlighted using different colors or fonts. Text from the WWW can be brought into a word processing program and read aloud by the computer to students. Additionally, text can be translated into almost any language using the translation programs provided on the Web.

**Give special attention to professional development.** Staff development is a major factor in the success of technology integration and can help prevent computers from being just one more failure in attempting to assist economically and culturally deprived children. “At least 30% of the technology budget should be used to provide teachers with ongoing mentoring and consultative support, and with time to familiarize themselves with available software and content, to incorporate technology into their lesson plans, and to discuss technology use with other teachers. As schools continue to acquire more and better hardware and software, the benefit to students increasingly will depend on the skill with which some 3 million teachers are able to use these new tools (Expert Panel 1997).” A school can have the best software ever made and access to the Web on every computer. But it won't see much difference in student learning, experts say, unless its teachers know how to use the digital content in their classrooms (Totter 1999).

For the past three years, I have worked as an early childhood instructional technology specialist on the Early Childhood Technology Literacy Project (ECTLP). A major emphasis of this project is to provide professional development to kindergarten, first grade, second grade, special education resource, and
ESOL teachers, specialists and instructional assistants. The professional development aspect of our project is to increase each participant’s ability to use technology as an instructional tool to improve student achievement in reading and writing. The professional development activities are aligned with Montgomery County Public School’s (MCPS) Reading Initiative and the National Staff Development Standards. All activities are integrated into the implementation of the MCPS Reading Initiative so teachers, specialists and instructional assistants receive comprehensive, cohesive training. Throughout the professional development activities, school collegial teams reflect upon their progress through the change process and work collaboratively to solve problems and make decisions about using the available technology as a tool to support their balanced literacy programs. Participants explore, develop and implement developmentally appropriate, differentiated activities that utilize technology to support the reading and writing instruction of all students.

Teachers and specialists from participating schools attend hands-on workshops throughout the school year. Each session focuses on using technology to support Maryland State Department of Education (MSDE) Reading/Language Arts Outcomes and provides opportunities for participants to share and problem solve with others. The teachers, specialists and instructional assistants who are part of the project for the first time participate in four full-day staff development workshops. These workshops acquaint them with instructional strategies, classroom management strategies, software applications, websites, and lesson plans that use technology to meet MSDE reading outcomes and enhance a balanced literacy program. During our workshops teachers have the time they so desperately need to explore digital content and process how they can best use technology to support student achievement.

Teachers, specialists and instructional assistants participating in the project for the second year attend two half-day workshops. At these sessions they have the opportunity to share successful strategies and have the support of instructional technology specialists as they create and implement technology integrated lessons while they continue to progress through the stages of the change process. Teachers felt that the benefits of seeing technology being used with their own students, in their own instructional settings, and having time to debrief afterwards was a very powerful component of our project.

Technology specialists make visits to each participating school to model lessons and conduct small group, just in time training.

To provide additional and more immediate school based support to participating schools, a Project Mentor program was established. Each school identified a teacher with strong leadership skills and a solid understanding of the reading/language arts curriculum and objectives to serve as the project mentor.
These mentors received two days of introductory training during the summer, attend bi-monthly after school sessions, and participate in on-line discussions via email.

The Project Mentors role is to act as the primary point of contact between the 34 participating schools and the ECTLP staff. In addition, they provide instructional support to grant participants, disseminate information about technology and balanced literacy to staff members not directly participating in the project, help ensure that software and hardware supplied by the project are shared equitably, and perform basic trouble shooting.

To provide opportunities for participants to share and explore ideas with teachers from different schools, several special interest workshops and discussion group meetings are held after school with peers who are not participating in the project.

Training videos, e-mail conferencing and the ECTLP web site enable participants to communicate, and extend their professional development experiences. The ECTLP web site [www.mcps.k12.md.us/curriculum/littlekids](http://www.mcps.k12.md.us/curriculum/littlekids) has received over 8,000 hits since it was created in June 1998 and disseminates training resources, lesson plans and best practices to teachers, parents and students in Montgomery County and throughout the world.

Teachers who have been participating in the project feel that their participation has made a significant impact on their teaching, implementation of the Reading Initiative, and student achievement in reading. One participant wrote, “This training has been one of the most important components in keeping me encouraged to continue to use the technology. Through the training and hands-on experience of using programs that allow the exploration I am no longer frustrated about implementing technology into the instructional program. In fact, now, I am always thinking about how I can integrate the technology into many lessons. This training is very important if you want teachers to continue to grow and use the technology in their reading and writing instruction.”

**Engage in realistic budgeting.** At least 5% of all public K-12 educational spending in the US should be earmarked for technology related expenditures so that there is ongoing technical support and computer maintenance. “This money should be viewed as having an unusually high-return investment both economically and socially (Expert Panel 1997).”

To help develop a realistic technology budget it is essential to look at the “Total Cost of Ownership” (TCO). “TCO is a method through which technology administrators may understand and manage all costs related to technology-related purchases, including up-front costs, after-purchase direct costs, and after-purchase indirect costs (Van Dam 1999). Jan Van Dam, who is the director of new media for...
Oakland Schools in Michigan, explains that “TCO for technology related purchases can make the difference between effective, efficient utilization and a useless expenditure.”

**Taking TCO to the Classroom** is a guide published by The Consortium for School Networking (CoSN). The guide suggests that when going through the technology planning process the following 6 categories should be thoroughly considered: professional development, technical support, software, replacement costs, retrofitting, and connectivity.

When planning for the Early Childhood Technology Literacy Project we took into account the TCO ideas and used the majority of our budget for professional development. We provided substitute release time and stipends to our participants to attend training workshops and observe model lessons. In the area of support, we included money to pay a user support specialist to help set up and maintain all of our computers. We also included money for part-time clerical support and support from the Department of Educational Accountability to help us collect and analyze data from our project. We provided each of our schools with 3 A/V multimedia Apple computers on carts with wheels for easy mobility, a networked color printer and Mavica digital camera. Additionally we gave our schools a selection of software and teacher resources that supports early literacy. To ensure that early childhood classrooms were connected to the local and wide area networks, we provided wiring for all participating classrooms. Without considering all TCO categories our program would not have had the impact on instruction that it does.

**Ensure equitable, universal access.** “Access to knowledge-building and communication tools based on computing and networking technologies should be made available to all of our nations’ students, regardless of socioeconomic status, race, ethnicity, gender, geographical factors, and special attention should be given to the use of technology by students with special needs. (Expert Panel 1997).” Since much of the educational uses of technology occurs at home, and computer ownership varies greatly due to economic factors, consideration of student access to information technologies outside of school should take place.

To help promote equitable and universal access to technology, the targeted population of our project is early childhood students and teachers in 34 Title I schools in Montgomery County Maryland. Purchasing computers on carts with wheels for all of our schools, has made access to computers easier for all participants. It has facilitated flexibility in the movement of computers to create mini-hubs when more than one computer is needed for an activity.

For students who may not have access to computers in their home, we created the Computer Family Night Program. Computer Family Nights give students and their families hands-on experience in a
nurturing and structured environment. Computer Family Nights are arranged to give students and their families the opportunity to work together to create digital family albums. Students are also given the chance to show their parents just what experts they have become at using the computer. After attending a Computer Family Night session, parents see the value of using technology as a tool to enhance learning. Here is what some parents said about participating in Computer Family Night.

- This Computer Family Night is a great idea! I would welcome more opportunities to actively experience what and how my children learn, not just observe the results of their work (such as parent-teacher nights and open houses). The program was also very well organized and implemented. Our compliments to the instructors. I hope the program will continue. It is really impressive to see first hand how comfortable these kids are with computers."

- It is programs such as these that help adults see how and what their children are learning. Whereas my husband and I are both very computer literate because of the nature of our jobs, I think that there are many parents who are not and do not often have the opportunity to attend programs like this. In fact, I think that most of the parents who attended this session with their children had as much fun as their children— I know I did!!"

- "Family Computer Nights are a great idea. My child got a chance to teach me lots of things she is learning. I think any activity which helps foster parent-child learning together is wonderful. These extra curricular activities should be expanded for maximum benefit."

**Initiate a major program of experimental research.** Though basic research is needed in determining various learning-related disciplines and on various educationally relevant technologies, developing new forms of educational software and digital content, and empirical studies determining which educational approaches are most effective, it is not recommended that the use of technology be deferred until all research is complete (Expert Panel 1997). Professor Chris Dede states that, “the most dangerous experiment we can conduct with our children is to keep schooling them the same at a time when every other aspect of our society is dramatically changing (1995).”

In our project we use teachers and students as researchers and collect data in a variety of ways. We use surveys, skills appraisals, needs assessments, training evaluations, observation, interviews, journals and portfolios. We analyze the data on an ongoing basis so that it can directly impact our training plan and help us to better meet the needs of our participants.

“Simply placing computers into classrooms isn’t going to change teaching and learning; it will not reform schools. For educational reform to take place, technology needs to be integrated into a "broad
effort for school reform, and considered not as the instigator of reform or cure-all but as a set of tools to support specific kinds of instruction and intellectual inquiry (Means and Olson 1994).”

As John Dewey once said, “If we teach today, as we did yesterday, we rob ourselves of tomorrow.” With ongoing staff development, technical support, and equitable access to hardware and digital content, young children will be empowered and the foundation will be laid for life long learning!

References


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