SEIR◆TEC News·Wire

THIS ISSUE:
Reading & Technology

SERVE
Improving Learning through Research & Development

Technology in Reading Instruction

The problem is clear—large percentages of students continue to score "below basic" in reading achievement. The percentage of fourth-graders performing at or above basic in 2002 was higher than in 1992, but not significantly different (National Center for Education Statistics, 2003). Further, the percentage of twelfth-graders performing at or above basic between 1998 and 2002 actually fell below levels achieved in 1992. As a major part of the No Child Left Behind Act passed on January 8, 2002, the Reading First initiative has provided federal funding to improve reading instruction in grades K–3, with access for teachers to professional development focused on applying scientifically based reading research. Beginning no later than the 2005–2006 school year, Reading First also requires states to annually assess student achievement in reading and math for grades 3–8. New tests may be created by the states or modified from existing off-the-shelf products, but they must align with academic content standards.

According to 2001–2002 baseline data, all southeastern states have already begun to set new goals for reading achievement. In Georgia, for example, a 20 percentage point increase in reading and language arts proficiency is planned between 2002–2011, with an additional 20 point increase between 2011–2014 after schools have had the opportunity to address subgroups who are significantly below proficiency (U.S. Department of Education, 2003). North Carolina's target goals include 8 percentage point increases in reading achievement, every three years for grades 3–8, with steeper increases for grade 10 (U.S. Department of Education, 2003). Most states seek 100% reading proficiency by the 2013–2014 school year.

In this period of emphasis on reading, this issue of *NewsWire* focuses on roles for technology to help train teachers in effective practices and to improve reading instruction in the classroom.

Topics discussed in this issue include:

◆ Attributes of computers and software that support the building blocks of reading.

◆ Model professional development programs delivered online, emphasizing effective uses of technology in reading.

◆ Web-based tools and resources to support reading instruction.

◆ Classroom technology projects integrated with reading.

◆ Handheld tools to support reading assessment and student literacy.

◆ Online links for teachers to reading lessons, strategies, lists, and associations.

As these examples show, schools and teachers can utilize technology to make a difference in student reading achievement and to ensure that no reader is left behind. ◆

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Reading Projects Incorporating the Web

by Kevin Oliver, Project Director, SEIR◆TEC at SERVE

One key area for future research identified by the National Reading Panel's (2000) subgroup on Computer Technology and Reading Instruction was how to incorporate Internet resources into reading instruction. Lesson plans that incorporate Internet resources are readily available online for all subject areas. This article provides a sampling of reading projects that utilize Internet resources and tools for classrooms with online access.

Map It. Have students select a city/town location for fictional travel in their state. Using the "Driving Directions" portion of the Mapquest website (**www.mapquest.com**), students enter the address of their school and then the name of their destination city/town. Students print the directions, read and decipher them, and trace the route on a map. Next, have each student select a secret location for fictional travel in the state and write out the directions to this location. (Teachers may find it helpful to require a certain number of directions/sentences for this assignment.) Have students swap their directions with a partner and have the partner try to trace this new route on a map, noting any errors.

Who Am I? This project is applicable to many topics, including dinosaurs, alien life, insects, plants, and animals. Allow each student time to select one specific item in a topic area, perhaps from a list generated by the teacher beforehand (e.g., for insects—ladybugs, for plants—the daffodil). Students research and read about their selected item online and write down as many facts as they can gather. Students should keep their selected research topic a secret. If working in a computer lab, try cutting a file folder in half and taping the two pieces to the sides of the computer monitor for added privacy. After conducting their research, students draw an original picture of their selected item on one piece of paper without letting the other students see it. They also

write a descriptive paragraph about their selected item on a second piece of paper. After posting student drawings in one area of the classroom, have each student read his or her paragraph aloud while the other students guess which picture it refers to.

Holiday Gift Giving. During the winter holidays, divide your students into teams and assign them a country to research and read about online. You might provide the students with a template for information gathering on such facts as population characteristics, common foods eaten, economic products, and more. To save time, the teacher might even pre-select specific websites for research. The goal of the project is to learn enough about a country to select a fictitious holiday gift appropriate for its people. Students may then create posters or replicas of their gifts to incorporate into a classroom display.

Advice. Utilizing one of the many "advice columns" on the Internet (e.g., gift-giving, time management, gardening), the teacher pre-selects some appropriate questions for his or her students to respond to (e.g., "I'm running out of room for files in my home office. What can I do to create more storage space?"). Students research their question topics online (e.g., storage solutions), then play the role of advice-giver, and write a solution for the questioner.

Import-Export With Keypals. Using one of the many keypal sites on the Web, locate a class in another state or country to communicate with your students (e.g., www.epals.com). Assign each student a keypal and have him or her exchange specific information with that partner. Students might ask partners where they live, what language they speak, what their school is like, and who is in their family. After this initial contact, tell students their keypals are considering starting their own businesses, exporting a product to our state or country. Students will need to conduct some basic research to help their keypals make wise business decisions. Provide students with a worksheet to use as they research and read about key business facts in their own state or country (e.g.,

primary exports, primary imports). Have students exchange worksheets. If additional information is needed to make a product selection, students can conduct further research on their keypals' states or countries. Students end the project by exchanging product selections with a written rationale for that choice.

Mystery Ingredients. The teacher selects several common food items eaten by students (e.g., candy bars, potato chips, etc.). The teacher pulls the ingredients from the label of each product (e.g., glucose, calcium propionate, aspartame) and lists them on a handout. Students are split into teams with each team given the ingredient list from one product. Student teams research and read about their ingredients online, noting the type of products containing that ingredient. Students look for patterns to determine which product contains all of the ingredients listed on their handout and inform the teacher when they are ready to guess.

The Producer. After students read an assigned book, have them type a brief summary of the main characters and their roles in the story using a word processor. After completing the writing portion of the assignment, inform students they need to "cast" their characters by selecting individuals for the roles. Students can take pictures of classmates with digital cameras, scan pictures from magazines and CD jackets, or save pictures of actors from the Web. If the Web is used, the teacher should pre-select a few studio and movie award sites in lieu of students searching the Web at large for celebrities. Finally, students import the images into their word-processed document. ◆

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Ask Eric Lesson Plans at
   http://ericir.syr.edu/Virtual/Lessons

Columbia Education Center at www.col-ed.org

Education Place at www.eduplace.com

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TeachNet at www.teachnet.com

Florida Offers Free Online Reading Methods Course to All Certified Teachers

by Gina Long, Instructional Technology Resource Center (ITRC) at the University of Central Florida, Orlando

The ability to read is a complex phenomenon. Reading is essential to success in our society; it is the major avenue to learning, and it must be mastered in school. Difficulty in learning to read influences children's motivation to learn because of the importance of reading, especially during the primary grades. Students must acquire the knowledge, skills, and strategies that will allow them to read, write, and think critically. Unfortunately, few of today's teachers have had intensive training in the research-based methods and strategies that will help their students learn to read and read to learn.

On September 7, 2001, Florida established *Just Read, Florida!*, a comprehensive, coordinated reading initiative aimed at helping every student become a successful independent reader. In support of this executive order, the Florida Commissioner of Education approved funding to develop and implement an online reading professional development system for teacher recertification purposes, skill development aligning to a professional development plan, and improvement of K–12 teachers' reading skills and knowledge.
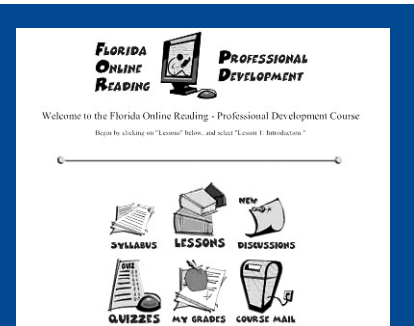
The goals of the Florida Online Reading Professional Development (FOR-PD) project are to:

◆ Support the Florida Department of Education in its statewide implementation of a reading professional development system using online delivery.

◆ Serve as a model for reading professional development online delivery.

◆ Translate scientifically based research into action, provide support, and empower teachers to use innovative, creative, and effective strategies to help all children learn proficiently.

◆ Increase teachers' knowledge base about reading.

◆ Improve curriculum and reading instruction.

◆ Improve student learning.

Currently available only to Florida's certified teachers, the critical components of the FOR-PD project include:

Statewide participation. This collaborative project is founded on ongoing active participation from the Florida DOE, executive board, advisory boards (i.e., content and technology), districts, Area Centers for Educational Enhancement (ACEE), district staff development, literacy and technology experts, and facilitators from districts and universities. State literacy and technology experts, school districts, professional organizations, and teacher educators across the state developed FOR-PD together. This

The Florida Online Reading Professional Development (FOR-PD) course is designed to provide a quality standards- and research-based professional development with K–12 teachers' and students' needs in mind. FOR-PD is aligned with *Just Read, Florida!*, the Florida Reading Endorsement and Certification, and No Child Left Behind.

project functions as a primary delivery mechanism for improving teaching methods in pre-K–12 reading instruction, and the course may be taken for staff development credit or for graduate credit through most of the state's public universities.
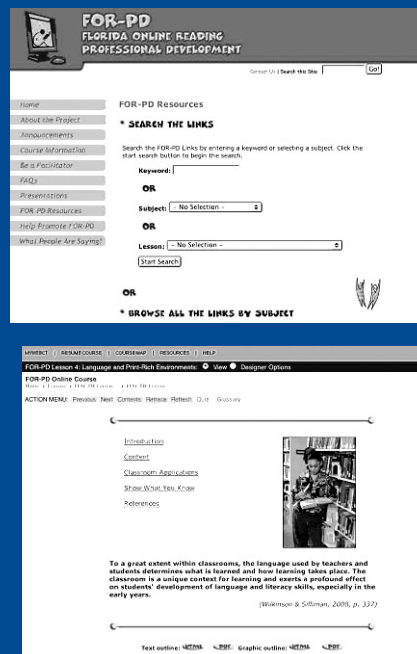
Exemplary reading instruction.

FOR-PD is delivering scientifically based reading research to K–12 teachers to help them improve their knowledge and skills about reading and to help improve all students' reading skills and performance. Classroom applications reflect current research findings and best practices. References are available in each lesson, and a searchable database of all online resources and references is available to all on the FOR-PD website.

Local flavor and implementation.

The FOR-PD course is facilitated by a literacy leader acquainted with district initiatives and other local and state literacy efforts and trained in online facilitation and the course delivery system. Participants register through their districts, and facilitators provide a link between the school district, the FOR-PD office, and participants. Facilitators help participants with both content and technical issues. They provide feedback and encouragement, comment on assignments, and relate on a personal and professional level with each participant. Various support tools are provided for facilitators including an electronic newsletter, a facilitator's online discussion area, an online facilitator manual, facilitator e-mail,

Technology: The FOR-PD course is delivered entirely in an online asynchronous environment using interactive content, hyperlinks to outside resources, quizzes, surveys, threaded discussions, and downloadable job aids and just-in-time printable materials for teachers. Minimum and recommended hardware and software requirements are outlined on the FOR-PD website (www.itrc.ucf.edu/forpd) and have been provided to all district technology and staff development teams. In addition, technology as a tool to assist in reading instruction and literacy is an integral part of FOR-PD lessons, including assistive technologies and Web-based programs. Technical support is provided by e-mail, toll-free phone number, and instant messaging. Technical support is not only provided during school hours but also during evening and weekend hours and summers, when most teachers have time to concentrate on course content.

online chat rooms, and a toll-free number to the FOR-PD office.

Statewide promotion. The Florida Department of Education (DOE) has provided ongoing promotion and support. FOR-PD has worked with universities, district and regional agencies, professional organizations, and other statewide projects to create and promote the course. FOR-PD also relies on these entities to provide quality facilitators, technology and technology support, and integration into and collaboration with other statewide initiatives. A promotional video has been produced and aired on the Florida Education Channel. It is available from the FOR-PD website, and

VHS close-captioned copies have been distributed to all Florida school districts. Informational flyers and brochures are available from the FOR-PD website's e-store. In addition, a poster promoting this project, three other state-funded literacy-related projects, and exemplary reading instruction has been widely distributed.

The project provides a wealth of opportunities for research by University of Central Florida (UCF) faculty and district staff and offers future collaborative possibilities. The project team, based at UCF, is also looking at alternative delivery systems to reach more teachers and teachers with different learning styles. For more information, visit the project website at www.itrc.ucf.edu/forpd or e-mail forpd@orion.itrc.ucf.edu. ◆

The course consists of 14 lessons. Each lesson includes an introduction, graphic organizers and content outlines, a reading strategy for participants to apply in the lesson, a synthesis of the current research, classroom applications and strategies, interactive review activities, online resources, a bibliography, a comprehensive glossary, an assignment, rubrics for completing and grading the assignment, and a self-grading quiz. Topics include reading and learning to read, print-rich environments, phonemic instruction and phonics, strengthening vocabulary development, teaching for understanding in content areas, and scaffolding students' comprehension.

Reading Assessment in the Palm of Your Hand

by Dan Shoemaker, Science/Social Studies Teacher, Cedar Ridge High School, Hillsborough, NC

With the advent of the Reading First initiative as a part of the No Child Left Behind Act of 2001 (NCLB, 2002), teachers need to document the reading levels and progress of students in class. Three types of assessment are recommended by Reading First: *screening* to identify high-risk children in need of special services or additional instruction; *diagnostic* to identify students' strengths, weaknesses, and difficulties in reading to determine appropriate interventions; and *classroom-based instruction* to evaluate student learning through systematic teacher observation of students working on academic tasks to improve instruction (see NCLB, 2002, Title I, Part B, Subpart 1, Sec. 1208-7). This article describes the use of handheld technology tools (e.g., a Palm Pilot) to aid in reading assessment.

One of the most labor-intensive components of reading assessment is the individual observation of students reading within the classroom. Frequent reading assessments are difficult because of the time needed to complete them, document the results, and then make the needed prescriptive changes to instruction. Three things cause reading assessment to be a slow, laborious process: observation forms, note cards, or tape recordings are completed for each child as they read a selected passage; information is tabulated to identify particular strengths and weaknesses within the child's skill set; and the results are documented, usually in the student's reading folder. The process is time-consuming and does not always yield the needed results in a quick and efficient manner. As a result, the interventions that are needed may not be identified and implemented promptly.

Technology can simplify this process with the use of Personal Digital Assistants (PDAs) to electronically score, analyze, and document reading performance. By placing assessment software on a PDA, teachers record assessment information, then "sync" with or upload the data to a designated website. Data can be used to develop reports and graphs about student, class, and school reading performance and to track progress over time. Individualized reports can be generated for student reading folders and parents. By using this tool to assist with paperwork, teachers can do assessments more efficiently and take less time away from instruction.

Judy Kelly of the Monroe Public School District in Monroe, Michigan, describes the use of PDAs to conduct reading assessments: PDAs "make the

assessments easier" and dramatically reduce preparation time, so "teachers have more time to focus on interpreting results and assisting children." The Monroe Public School District uses PDA software from the mClass: Reading product line (Wireless Generation, 2003) that was designed to diagnose the five essential components of reading as recommended by the National Reading Panel (2000) and advocated by the Reading First initiative: phonemic awareness, phonics, fluency, vocabulary, and comprehension. Specifically, the Monroe School District uses the Qualitative Reading Inventory (QRI-3), "designed to determine a student's instructional reading level, reading strengths, and areas where instruction is needed" (Leslie, 2003, p.1). The program at Monroe Public Schools started with 20 reading teachers and has expanded to 90. The program is voluntary, but with a short learning curve and clear benefits to students, teachers are volunteering to make this transition. According to Kelly, initial success has led to an expansion of the program within the district.

While PDAs themselves have little effect on student performance, the advantages of collecting reading assessment information using handhelds are clear and include efficient tracking of student progress over time and easily shared student information with other teachers, administrators, and parents. Overall, teachers get more time to teach, parents are kept more informed, and student reading levels are assessed in a more consistent manner. Instead of intuitive teacher judgments, data can be used to determine the best course to assist students learning to read. And all of this is waiting in the palm of your hand. ◆

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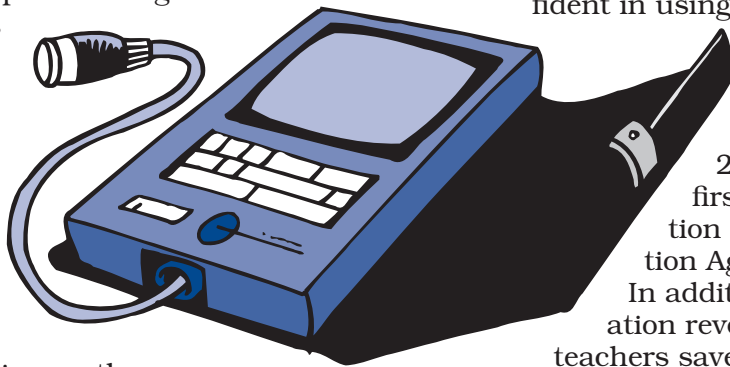Wireless Generation. (2003). *mClass:Reading*. Retrieved from www.wirelessgeneration.com/web/readingProducts.html

Reduced Reading Assessment Time in Texas With the mCLASS: TPRI Handheld Application

by Tammy Buckner, Director of Special Projects, Division of Educational Technology, Texas Education Agency

The Texas Primary Reading Inventory (TPRI) pilot project explored the use of a handheld personal digital assistant (e.g., PDA, such as a Palm Pilot) to collect student performance data as teachers assess individual students using the TPRI (for more information on the TPRI, see **www.tpri.org**). A software-based version of the TPRI was developed for the pilot that runs on a PDA. A teacher uses the PDA-based TPRI to assess the student while the student reads from print-based TPRI materials. Once assessment is complete, the software program uploads individual student data to a secure database via the Internet. The database then aggregates data for all students in a classroom and makes it accessible back to the teacher on a secure website. The secure website offers various data analysis tools and recommended teaching intervention strategies that are tied to certain student performance benchmarks.

The primary goals of the project were to develop the handheld and secure website applications, deploy them to a variety of classroom types across multiple school districts, successfully use them for actual TPRI administrations, and provide more useful student performance data immediately to teachers. The pilot was successful in reaching all of its goals. An evaluation of the pilot showed that even though 88% of teachers had no prior experience using a Palm, 92% of teachers were very confident in using the Palm and mCLASS:TPRI application (Wireless Generation, 2003) after the first administration (Texas Education Agency, 2003). In addition, the evaluation revealed that teachers saved an average of 4.62 hours per class administration, including data entry and aggregation with the mCLASS:TPRI application.

The project involved a partnership between the Texas Education Agency, University of Texas Center for Academic and Reading Skills, Region IV Education Service Center, and vendor Wireless Generation. Because of the pilot's success, the project has now entered statewide implementation in Texas and is also being marketed in other states across the country. ◆

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Texas Education Agency. (2003). *TPRI Pilot 2002–2003.* Retrieved from **www.tea.state.tx.us/technology/pilots/pilots_tpri.html**

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Using Handheld Technology to Improve Literacy Skills: A SEIR◆TEC Workshop

by Kevin Oliver, Project Director, SEIR◆TEC at SERVE

During the summer of 2003, SEIR◆TEC staff at SERVE and the Instructional Technology Resource Center (ITRC) at the University of Central Florida met with K12 Handhelds' professional development specialists to plan a workshop on "Using Handheld Technology to Improve Literacy Skills." The team outlined a half- and full-day workshop, beginning with an overview of handhelds in the classroom (advantages and disadvantages, classroom management techniques, etc.), a summary of handheld and reading research, and a discussion of literacy as defined by the National Reading Panel's (NRP) five key components of reading instruction (phonemic awareness, phonics, vocabulary, comprehension, and fluency) and, more broadly, as six inter-related components (reading, writing, speaking, listening, viewing, and thinking). Although the workshop focuses primarily on reading and writing, the concepts presented overlap with other areas of literacy and 21st century skills as well (**www.21stcenturyskills.org**).

The workshop then presents a lesson plan that uses handhelds to develop literacy skills. As a part of this lesson, to provide hands-on experience, the workshop includes six different stations to illustrate how handheld technology can support the reading and writing components of literacy. Rather than teaching participants how to use a variety of handheld software applications out of context, the team selected an existing SEIR◆TEC lesson plan to ground the learning—Autobugography (**www.gritsonline.org**). The Autobugography project provides classes opportunities to combine scientific research with creative writing. Each participating class explores its surroundings in search of insects that the students will research for the purpose of creating autobugographies, which are short stories written from an insect's point-of-view (first person), and each autobugography is accompanied by the insect's portrait, either created by the student or taken digitally.

After an overview of the lesson plan, workshop participants select up to three stations to visit in order to see how the various handheld applications support reading and writing in the lesson. The grid on the following page illustrates the six stations and a sample handheld software application for each. (Additional applications will be demonstrated at each station.)

As a follow-up to this lesson plan, divide students into teams of three or four and allow them to create a new story by "writing in the round." One student types a sentence about his or her bug, then beams the text to the next student who continues the story by typing an appropriate response for that bug. New sentences should reveal characteristics of the students' bugs. Teams can be asked to read their stories aloud to the class.

If you are interested in supporting the reading and writing components of literacy through handheld applications, look for SEIR◆TEC's workshop "Using Handheld Technology to Improve Literacy Skills" at upcoming state conferences in the Southeast and at national educational technology conferences. ◆

Stations	Applications for Hands-On Technology for the Autobugography Lesson
1. Graphic Organizers	To help students select a bug, the teacher utilizes Hands High Software's Thought Manager application to create and beam a customized worksheet to their handhelds. The worksheet contains the 26 letters of the alphabet, and students are asked to brainstorm as many bugs as they can think of that begin with each letter (writing). In a cooperative, think-pair-share strategy, students beam their completed lists to a partner and read their lists aloud for comparison (phonics). **www.handshigh.com/html/thoughtmanager.html** The teacher asks students to select a specific bug, and then uses Palmtop Learning's Idea Pad to outline their selections. Students are asked if any of the bugs should be grouped together in specific categories (e.g., bees), and the teacher uses Idea Pad to visually map these relationships. IdeaPad can also be used to determine the elements students feel each autobugography should include, such as Where do I live? What do I eat? What do I look like? **www.palmtoplearning.com/idea_pad.html** Students can use Hi-Ce's iKWL to determine what they think they know about their bug, what they would like to know, and how they will get the information. **www.palm.hice-dev.org/beta.php**
2. Web Clipping	Students use the AvantGo application to move Web pages and graphics from desktop computers to their handhelds to research and read about their selected bugs (fluency). Students are asked to find and pronounce the scientific name for their selected bug (phonemic awareness, vocabulary). **http://avantgo.com**
3. Multimedia	As part of research, the students use Kinoma's video player on their handhelds to view video clips about bugs (viewing) and listen to the associated audio (listening). The students use Veo's Photo Traveler digital camera to take photos of real bugs or bugs in books, and software such as Voice Memo in Palm Tungsten handhelds to record bug sounds or the scientific names for their selected bugs (speaking). Captured multimedia elements, such as photos and audio recordings, can be later incorporated into student stories. **www.veoproducts.com/Traveler_Palm/default.asp** **www.kinoma.com/products.html** **www.palm.com**
4. eBooks	The teacher pre-selects or helps students download eBooks on their selected insects, including books with multimedia elements as described above. After installing Palm Digital Media's Palm Reader, students can download and read eBooks from numerous sources such as Memoware (fluency). **www.palmdigitalmedia.com** **www.memoware.com** Students access handheld accessories, such as dictionaries and thesauri to help create stories about their selected insects (vocabulary, writing). Palm Digital Media's eBook Studio allows students to convert their stories to the Palm Reader format and embed indices, images, and links. **www.palmdigitalmedia.com/ebs.cgi/2**
5. Authentic or Diagnostic Assessment	The teacher utilizes Learner Profile or Wireless Generation's mClass: Reading software to diagnose and track the reading skills of students as they read passages from selected material (phonemics, phonics, vocabulary, fluency). **www.learnerprofile.com** **www.wirelessgeneration.com/web/readingProducts.html**
6. Traditional Assessment	To help students organize their thinking prior to writing autobugographies, the teacher develops a fill-in-the-blank worksheet using Pocket Mobility's Quizzler application. Students write down the information they have found through research and reading (e.g., "My bug lives in …" "My bug eats…") (vocabulary, comprehension, writing). When finished, students beam their worksheet back to the teacher and read their sentences aloud (phonemics, phonics). The teacher determines if the students have enough information to begin creating their stories. **www.pocketmobility.com/quizzler**

Using eBooks in Education

by Karen Fasimpaur, K12 Handhelds, Inc.

Books are a key part of any learning environment, and as learning environments are going digital, so too are books. Electronic books, or eBooks, are electronic versions of books. They may be viewed on desktop computers, laptop computers, handheld computers, or proprietary devices designed to be the size of a book.

While some educators are philosophically opposed to the idea of electronic books, it is indisputable that eBooks are gaining in popularity and that students find eBooks appealing. Some students are more enthusiastic about reading and, as a result, read more when using eBooks. For example, one school in California using handhelds with replaceable AAA batteries reported that students were reading eBooks at home with such enthusiasm that battery replacement was getting to be a significant issue. This enthusiasm may be in part because the electronic format is more engaging and comfortable to students. In addition, the presentation of text in smaller chunks and the availability of more controls on text presentation may be more comfortable to young readers.

EBooks have the advantage of being easy to carry around. This is a significant issue with recent health concerns about students carrying heavy backpacks. EBook devices can contain numerous volumes and have special features that are not available in the print versions of books. These features may include searching, built-in dictionaries, annotation tools, bookmarks, variable font size, hyperlinks, and auto-scrolling.

Because of these special features, eBooks are often seen as a tool for implementing universal design principles. These principles seek to ensure that every individual learner's differences are accommodated.

There are many examples of how eBooks can be used to differentiate instruction for learners. EBooks can be linked to a variety of resources, such as additional text, dictionaries, thesauri, pictures, videos, or audio clips. Students can be given eBooks that are customized to their specific needs using these tools. For example, non-native students may be given additional text support to explain cultural references with which they may not be familiar. Students with dyslexia may be given audio recordings of the content so that they can better access it. Students with vision impairments may have their handhelds connected to a screen reader or Braille output devices.

EBooks can also be linked to writing tools through the use of annotations. Teachers can use annotations to provide scaffolding or questions for student response. Students can answer specific questions, record general observations, or write questions they may have about the text. These annotations can then be exported and beamed to the teacher through infrared or wireless.
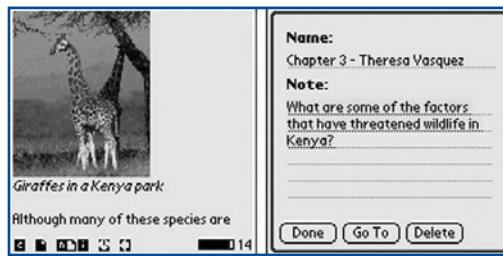

Giraffes in a Kenya park

This eBook gives students information for a project they are working on about Kenya. As a part of their research, they answer questions and beam their responses to the teacher.

In order to use eBooks, you need the following:

1) **EBook reader device**—This can be a standard desktop or laptop computer, a handheld computer (such as a Palm or Pocket PC device), or a specialized eBook reader (such as the Franklin eBookMan).

2) **EBook reader software**—This is the software that displays your eBooks for reading. There are many different eBook reader programs, each with

different features. Some are free, and some are commercially available. You need to make sure to get a reader that is designed for your hardware platform. In addition, you will want to get a reader that has an ample number of appropriate eBooks available for its format. (See box for examples of eBook reader programs.)

3) **EBooks**—These are the actual eBook documents that your reader software displays. EBooks come in a variety of formats that are specific to certain reader software. There are also a few generic formats, such as .txt files on the desktop platform, LIT files on Pocket PC, and Doc files on the Palm operating system, that are generally readable by any reader. Those generic formats lack the special features of other formats, however.

There are thousands of eBooks currently available on a wide variety of topics. Some are free, and others are sold commercially.

One of the drawbacks to using eBooks in education is the limited amount of content available. A growing amount of literature selections are available as eBooks, but most textbooks are not. This is likely to change, however, as time passes and the eBook format is in more demand by schools.

It is also quite easy to make your own eBooks. This is a great way to present scaffolded content to students in an engaging and educationally sound manner. It is possible to put pictures, diagrams, charts, and graphs in eBooks, and multimedia capabilities are increasing. EBooks that offer visual support, audio support, and even video support are another way to increase content accessibility to a variety of students.

Some schools have students make their own eBooks. This is a sound way to teach literacy and technology skills in a real-world context by giving students a genuine audience for which to publish. Students are very proud of their work when they produce eBooks to share with peers, younger students, e-pals, parents, and community members.

Here are some ideas for using eBooks with your students:

◆ Make an eBook that students can use as a research resource in a project they are completing.

◆ Have students make eBooks summarizing key concepts they have learned in a unit. Have them post their eBooks for others to use in studying for this unit.

◆ Have students read eBook novels and respond to questions that you have embedded in the text.

◆ Have students make eBooks to share with younger students. ◆

Popular eBook Reader Programs	Websites with Free eBook Content
Palm Reader www.palmdigitalmedia.com	**Memoware** www.memoware.com
iSilo www.isilo.com	**Gutenberg Press** www.gutenberg.net
TomeRaider www.tomeraider.com	**University of Virginia Library** etext.lib.virginia.edu
HandStory www.handstory.com	**Alex Catalogue of Electronic Texts** www.infomotions.com/alex
Microsoft Reader www.microsoft.com/ebooks	**PDABooks.org** www.pdabooks.org

Research on Reading and Technology: Promising Practices Require Further Study

by Kevin Oliver, Project Director,
SEIR◆TEC at SERVE

How is technology used in reading instruction, and does it make a difference in student achievement? According to researchers, computers can have a positive effect on student reading achievement (Blok, Oostdam, Otter, & Overmaat, 2002; Soe, Koki, & Chang, 2000). Limitations in research design and limited studies in key technology areas, however, make it difficult to advocate specific software tools and technology-enhanced lessons. To realize the potential benefits of technology in reading instruction, educators should carefully select tools and strategies with attributes that support learning the essential components of reading.

The Reading First Initiative of the No Child Left Behind Act recommends that programs of reading instruction, including technology-based learning systems, support the learning of one or more of the National Reading Panel's (NRP) (2000) five essential components of reading instruction: phonemic awareness (hear, identify, play with sound), phonics (understand the relationship between written and spoken language), fluency (read accurately, quickly), vocabulary (know words with which to communicate), and/or comprehension (understand and interpret what one reads).

Computer-assisted instruction (CAI) is one of the most common uses of computers in reading instruction. CAI includes drill and practice software that allows students to repeatedly work through practice exercises to reinforce appropriate responses (e.g., selecting the appropriate vocabulary word from a list after hearing the word spoken—

phonemics). CAI includes tutorial programs that present instructional material much like a teacher (e.g., how to break words into their phonetic components) (Alfaro, 1999). CAI also includes responsive dialogue programs that can record, interpret, and respond to a student's reading fluency by adjusting the level of future readings.

Holistic CAI environments are also available that teach multiple NRP components in one instructional package. These multimedia-based environments often embed reading instruction in the context of authentic stories or problems. For example, a video-based story about inner-city teens described by Bransford, Sharp, Vye, Goldman, Hasselbring, Goin, O'Banion, Livernois, and Saul (1996):

- Uses voice recognition to comprehend and judge a student's oral reading to build phonemic awareness.

- Uses graphics and sound to illustrate letter-sound correspondence and build phonics skills.

- Tracks individual student's vocabulary and allows them to create their own books for reading and sharing with their personal set of words.

- Presents "discrepancy passages" where a student selects the written passage from a set that most closely represents the story shown, encouraging reading for meaning and comprehension beyond reading for singular words in isolation.

Other computer attributes that are suggested to support improved reading achievement include the ability for the computer to:

- Accept free-form responses to comprehension questions above and beyond multiple choice type

questions; students who write long answers more frequently on assignments and exams score higher in reading (National Center for Education Statistics, 1991).

◆ Enable the strong connection between writing and reading through word processing (National Reading Panel, 2000b; Underwood & Underwood, 1990); allow students to practice reading by writing in different forms (e-mails, cafeteria menus, stories, science reports, school website, newsletters); allow students to rewrite/retell in their own words a multimedia story they have viewed or write an alternate ending to a story; allow students to tell and record their own oral stories, then replay and rewrite their stories using a word processor to generate personally relevant reading material; allow students to re-sequence jumbled sentence fragments or a process-based set of instructions, forcing them to focus on meaning and comprehension in addition to word decoding.

◆ Engage students in reading tasks for longer periods of time, motivate students to read more, given the novelty effect of computers which are currently seen as more interesting than conventional instructional materials (National Reading Panel, 2000b).

◆ Hyperlink to related subject matter to help build comprehension; some student control over presentation has been shown to improve vocabulary and comprehension of text, as well as encourage students to read in more detail on other areas of interest, and hypertext access to different types of texts (expository, narrative, reference, fiction) promotes opportunities to practice different reading strategies (Council for Education Development and Research, 1996; National Reading Panel, 2000b).

◆ Connect students to more reading materials online than they would ordinarily have through online catalogs, links on their teachers' Web pages, etc. (Council for Education Development and Research, 1996), since children from "literacy-rich home environments…demonstrate higher reading knowledge and skills than other children" (National Center for Education Statistics, 2003, p. 5); note, however, research shows learners will not read lengthy text online (Davis, 2003).

Meta-analyses that summarize a collection of research studies have shown that computer-assisted instruction can lead to a small increase in reading achievement, especially for early readers (Blok et al., 2002; Soe et al., 2000). Those analyzing reading and technology studies, however, describe research problems with small sample sizes, lack of control for individual student differences, and lack of longitudinal study. Further, despite the presence of several hundred empirical studies on reading and technology, the NRP (2000b) subgroup on Computer Technology and Reading Instruction found only 21 studies that met its criteria for research, including experimental or quasi-experimental methods, focused on instruction, about general populations, and not including studies of word processing that have received previous attention. In certain areas, research was simply lacking, including how the Internet, voice recognition, and multimedia can be used to support reading instruction (National Reading Panel, 2000b).

Many promising technology-enhanced strategies to support reading achievement with some documented success are available. As noted, however, limitations to existing research and few studies to replicate in key areas (e.g., using Internet resources in reading instruction), make it difficult to advocate specific instructional technology solutions. Thus, technology-based reading programs that claim to be "research-based" should be investigated and balanced against their ability to support at least some of the five NRP components of reading instruction. Technology can positively influence reading achievement if educators carefully select tools and plan technology integration strategies. ◆

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Information Literacy: One of the New 21ˢᵗ Century Learning Skills

by June Weis, Research Assistant, Educational Technology, SREB

> *The Internet is rapidly entering nearly every classroom in developed nations around the world…We must pay particular attention to developing the critical literacies these new technologies demand.*
>
> —International Reading Association, 2001

Is information from electronic sources fact or opinion? How do you know? For all the information in credible sources in cyberspace, there is an equal or greater amount of misinformation. Many Web resources have no editing policy as we have come to expect from reputable print resources. So, how do students learn to find, evaluate, and use accurate information appropriately? This is not a small concern to teachers, librarians, and curriculum specialists.

There is also a growing trend among business and industry leaders to influence the design of learning skills needed by students and workers in this emerging digital age. 21ˢᵗ Century Learning Skills (NCREL, 2003) has been adopted as the collective approach for identifying skills needed by students and workers. Information literacy is one of these skills. Just how do we define these *information* literacy skills that have become an important element of not only reading and language arts instruction but all areas of the curriculum? A widely accepted definition reads, "Information Literacy is defined as the ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand" (National Forum on Information Literacy, 2003).

Why focus on information literacy skills?

"Literacy" has become the defining descriptive word as groups attempt to examine and develop essential skills that prepare students to live, learn, and work successfully in this digital age. These emerging skills (NCREL, 2003) reach across all curricular areas to include visual and information literacy; cultural literacy and global awareness; and basic, scientific, and technological literacy.

> *The greatest challenge facing us today is how to organize information into structured knowledge. We must rise above the obsessions with quantity of information and the speed of transmission, and focus on the fact that the key issue for us is our ability to organize the information once it has been amassed, to assimilate it, to find meaning in it and to assure its survival. And that cannot be done without reading and literacy.*
>
> — K. C. Lance (2003)
> Director of Library
> Research Service,
> Denver, Colorado

Before *information literacy* became the watchword, states were already implicitly including these skills in traditional reading and language arts standards. These existing standards probably include language similar to: "The student understands the meaning of what is read," or "The student reads and comprehends a variety of material." To meet these reading/language arts curriculum standards, students must demonstrate several skills:

◆ Comprehend important ideas and details

◆ Expand comprehension by analyzing, interpreting, and synthesizing information and ideas

◆ Think critically and analyze author's use of language, style, purpose, and perspective (Washington Office of Superintendent of Public Instruction, 2003).

Most states have also adopted technology standards and skills, but these standards rely strongly on acquisition of computer skills. Integrating technology into student learning continues to be a challenge, and this means more than students acquiring proficiency in computer skills.

Recently, some states have gone beyond simply identifying information literacy skills within reading and language arts standards or within technology standards. They have adopted an information skills curriculum in which literacy skills are defined within discrete standards and learning strategies. Focus is on student responsibility for learning and includes a wide variety of reading and analytical skills, such as:

◆ Self-directed learners select discriminately from a wide array of resources.

◆ Self-directed readers read, listen, and view for pleasure.

◆ Complex thinkers question the messages presented in the mass media (North Carolina Department of Public Instruction, 2003a).

The primary tools used for developing these literacy standards have been the National Educational Technology Standards for Students (International Society for Technology in Education, 2003), the guide most often employed by teachers and administrators in developing technology standards, and the Information Literacy Standards for Student Learning (AASL, 2003). The AASL Standards focus primarily on accessing, evaluating, utilizing, and creating information and are the focus of strong school library media programs. Together these two sets of standards promote a proven successful collaborative strategy for classroom teachers and library media specialists in teaching information literacy skills, a vital component of the reading curriculum. Other 21st Century Learning Skills (NCREL, 2003) will impact information literacy standards as essential skills for the Digital Age are further defined.

Is there any evidence that information literacy skills make a difference in student achievement?

There is extensive research gathered from seven state studies on the impact of school libraries on student achievement (Library Research Service, 2003). These studies consistently show that reading scores increase when several characteristics of school library programs are available. Not the least of these characteristics, which include staffing and available technology resources, is integration of information literacy into the curriculum.

How are SEIR◆TEC states incorporating information literacy skills in state curriculum standards?

How are SEIR◆TEC states moving from teaching isolated technology skills to integrating these skills with effective information literacy? How are they identifying learning strategies that influence how students access, evaluate, and create information in all areas of the curriculum? A search of SEIR◆TEC state websites and inquires of state education agency staff reveal that each state is doing something different. Some states are implicitly including information literacy skills in language arts and reading curriculum standards, or they are addressing these skills by providing guides and resources in appendices to the state curriculum standards. North Carolina has developed an Information Literacy Curriculum as a course of study. There are some common strands in these reported approaches to addressing both technology and information literacy skills:

◆ *NETS for Students* are reflected in all SEIR◆TEC states' technology and information literacy standards or guidelines (International Society for Technology in Education, 2003).

◆ In Alabama, Georgia, North Carolina, and South Carolina, technology skills are also correlated with *Information Literacy Standards for Student Learning* (AASL, 2003).

◆ Information literacy skills are aligned with state standards in Alabama, Florida, Georgia, and South Carolina.

◆ North Carolina and South Carolina have developed matrices for teaching skills for each grade level. In Georgia, these skills have been developed by the Georgia Library Media Association.

◆ At present, North Carolina is the only SEIR◆TEC state that has incorporated a *Course of Study of Information Literacy Skills* within state standards (North Carolina Department of Public Instruction, 2003). A strong commitment to restructure education in North Carolina was promoted in *The New ABCs of Public Education* in 1995. "The B in the *ABC*s focuses on instruction in the basics—specifically the mastery of reading, mathematics, and writing. Information literacy skills are essential for students. When integrated with the core curricular areas, these [information literacy] skills enable students to improve and enhance their learning of the other basic skills [including reading]." The new *Information Skills Curriculum* was adopted in 1999.

◆ Florida and South Carolina have adopted the *Big6™ Information Problem Solving Skills* model (Big6 Associates, 2003).

Research for this *NewsWire* issue indicates two important trends: addressing information literacy skills explicitly in state curricula is becoming more apparent, and a focus on collaboration is becoming more important. This means perceiving information literacy and technology as a singular concept with emphasis on information literacy and delivering effective instruction through collaborative efforts of classroom teachers and school library media personnel.

The following chart provides a description of how information literacy skills are presently included in state standards in SEIR◆TEC states. ◆

Integration of Information Literacy Skills

Alabama

Alabama Course of Study: Technology Education prescribes the content standards for the one-half credit of the computer applications required for grades 9–12 as well as technology content standards for grades K–8. These standards provide instruction that integrates the use of a variety of technologies for accessing information, sharpening problem-solving skills, and encouraging critical thinking. They are correlated with *NETS for Students* (International Society for Technology in Education, 2003).

Literacy Partners: A Principal's Guide to an Effective Library Media Program for the 21st Century (Alabama Department of Education, 2000) effectively defines essential skills for K–12 information literate and independent learners based on *Information Literacy Standards for Student Learning* (AASL, 2003). ALEX (2003) provides links to a selection of information literacy lesson plans. Literacy skills and additional lesson plans are identified in English Language Arts K–12 standards. Primarily focusing on computer skills, Content Standards–Technology Education K–12 also contains information literacy skills.

Florida

The Sunshine State Standards for K–12 approved in 1996 were written in seven subject areas, each divided into four separate grade clusters (Pre-K–2, 3–5, 6–8, and 9–12). In addition to the Grade Level Expectations, course specific information for students in grades 6–12 can be found in the Florida Course Descriptions (Florida Department of Education, 2003a).

Neither information literacy skills nor technology skills are identified specifically in standards or courses of study for grades 6–8 or 9–12. However, these skills are woven throughout Florida's Sunshine State Standards and can be extracted from an online resource page provided by Instructional Technology Resource Center (ITRC) (2003). A panel of Florida's educational technology leaders has identified curriculum areas in which technology should be considered an integral component. The more typical information literacy skills are integrated into the Language Arts standards, but they are also defined in other areas of the curriculum, as noted by the IRTC (2003).

SUNLINK (Florida Department of Education, 2003b) has been a unique and powerful electronic tool developed to help students and teachers locate library media materials they need. Information skills can be sharpened as students construct searches to locate specific titles. Teachers can also search for materials to support the Sunshine State Standards by using a keyword search. Florida's Language Arts Standards are also aligned with *Big6™ Information Problem Solving Skills* (Big6 Associates, 2003). For additional information, please see Information Literacy: Florida's Library Media / Curriculum Connections at **www.firn.edu/doe/instmat/ilflmcc.htm**.

Georgia

Georgia's Quality Core Curriculum Standards are located on the Georgia Learning Connections website (Georgia Department of Education, 2003). Technology Integration Standards, based on *NETS for Students* (International Society for Technology in Education, 2003) are identified in the QCC Standards.

Information Literacy Skills is a collaborative development of the Georgia Library Media Association and the Georgia Department of Education, and these skills are aligned with the QCC Standards and *Information Literacy Standards for Student Learning* (AASL, 2003). Information Literacy Skills content for all grade levels enumerate the specific skill, identify procedures and activities for teaching the skill, and align the skill with QCC Standards. Georgia has not adopted Information Literacy Skills as a component of the QCC Standards, but they are included in the Ancillary Materials on the Georgia Learning Connections website (Georgia Department of Education, 2003).

The Georgia Library Media Association has developed a Media Skills Checklist—a grade-by-grade checklist of information literacy skills that students should know and be able to perform as they progress through their academic experiences (Georgia Library Media Association, 2003).

in SEIR◆TEC States

Mississippi

Mississippi has developed technology standards for teachers and administrators based on the International Society for Technology in Education (ISTE) Standards. Technology standards for students are in development, and currently *NETS for Students* (ISTE, 2003) serves as the unofficial guide.

While information literacy skills are not specifically named in curriculum guides (Mississippi Department of Education, 2003), some skills are identified in the *Technology Resource Guide,* a supplement for grades 4–8 (Mississippi Department of Education, 2000). This resource is designed as a companion document to the *Reading Instructional Intervention Supplement*, grades 4–8, to provide the reading teacher options for including technology in instructional practices (Mississippi Department of Education, 1999).

Mississippi Department of Education is also offering an online course, Research Using Technology's Information Tools (Info Tools), for grades 10–12. This research-oriented Web-based course is offered in partnership with *Classroom Connect* to help students develop the Internet and inquiry skills needed to use online information tools efficiently and effectively.

North Carolina

North Carolina is a leader among all states that have adopted Information Skills Curriculum (North Carolina Department of Public Instruction, 2003a) as a Course of Study in state curriculum standards. This document is to be used in conjunction with *IMPACT: Guidelines for Media and Technology Programs,* an online media and technology resource (North Carolina Department of Public Instruction, 2003b).

North Carolina has a long history of including information literacy skills in its courses of study—as far back as 1985 and subsequent revision in 1992 when Library Media and Computer Skills were included in the curriculum. In 1997, a thorough review and update of the old standards involving all levels of professional personnel was begun. After a systematic review, the new Information Skills Curriculum was adopted in 1999, based on *Information Literacy Standards for Student Learning* (AASL, 2003).

Information Skills Integration Strategies for grades K–8 provide activities that support tried and true strategies, activities, and ideas for media coordinators and classroom teachers as they teach the essential knowledge and skills that prepare students to locate, analyze, evaluate, interpret, and communicate information and ideas in an information-intensive environment.

South Carolina

The South Carolina Information Literacy and Technology Integration Plan, a collaborative plan of the Department of Education Office of Technology and School Library Media Services, was just finalized in May 2003 (South Carolina Department of Education, 2003).

Alignment with AASL *Information Literacy Standards for Student Learning* (AASL, 2003), *NETS for Students* (International Society for Technology in Education, 2003), and the state academic standards is included in this continuum. Another resource included is a curriculum overlay (one per grade for K–5, one for middle school grades 6–8, and one for high school grades 9–12). This Performance Matrix indicates the skills that should be introduced at each grade level, which skills should be reinforced at each grade level, and at what grade level the student should be working independently. Sample lesson plans will be available soon to show these standards in action.

Focusing on adding rigor to the curriculum to help students locate, access, and evaluate the information they find as they apply this new information to their current body of knowledge, South Carolina uses the *Big6™ Information Problem Solving Skills* model as the framework for this project (Big6 Associates, 2003).

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SEIR◆TEC

Using an Internet Tool to Foster Reading/Writing Connections
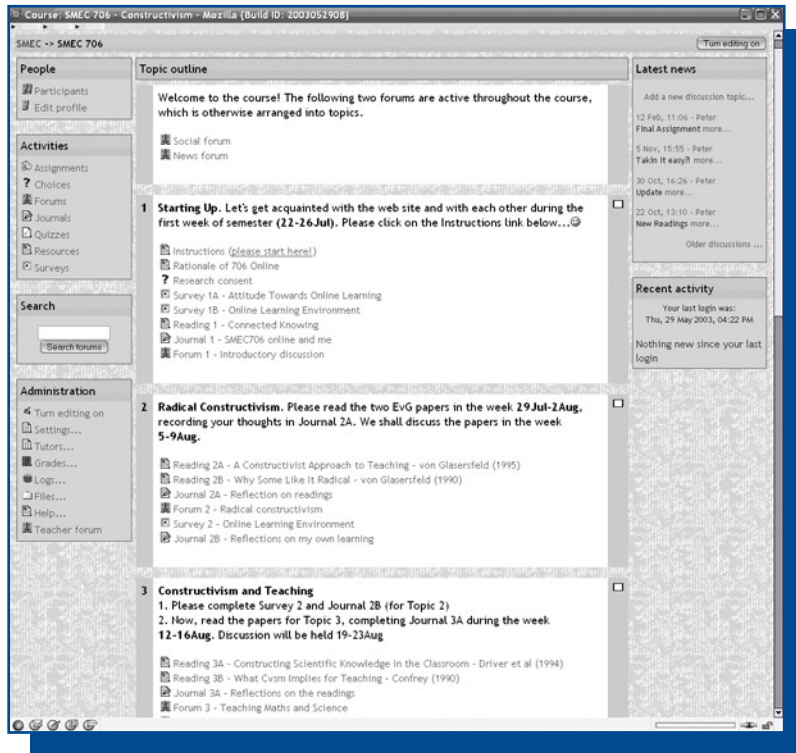
*by Beth Thrift,
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at SERVE*

The National Reading Panel's (NRP) sub-group report *Computer Technology and Reading Instruction* claims that "word processing in writing instruction could be an important and effective addition to the reading curriculum" and "reading instruction can probably make good use of the motivational aspects of computers and software" (NRP, 2002). Finding new ways to incorporate word processing can be challenging, so why not turn to the Internet for a solution?

The use of online courseware programs is an intriguing Internet option teachers might consider in order to promote and strengthen reading and writing connections. Although Web-based courseware programs have primarily been used for distance education, educators are beginning to use them to enhance classroom instruction. While there are several Web-based courseware programs available (e.g., Web CT, Blackboard, and Terra Dotta, to name a few), we will investigate only one here—Moodle, an open source, Web-based courseware program developed by Martin Dougiamas (1999).

Using a concept map to frame the content, educators can easily incorporate the SQ4R reading/study method (survey, question, read, reflect, record, and review) when using Moodle. This structure is one with which students are already familiar, such as the table of contents in most textbooks or the outline feature in a word processor. As students begin navigating the content, progressively deeper sub-groupings of concepts are revealed requiring comprehension skills, such as inference, patterns, summarization, and elaboration, and explicitly encouraging the first step of SQ4R reading strategy, that of surveying a text (Dougiamas, 1999).

As the student progresses through the teacher-developed course, each subsequent Web page addresses a single concept that is structured with one of five types of activities and includes one reading and one writing response to the reading. Because "reading and writing have many characteristics in common...readers increase their comprehension by writing, and [their] reading about the topic improves writing performance" (Knuth & Jones, 1991).

The five activities are:

1. The student *writes an answer to a specific question* in a form field directly on the Web page (SQ4R = Question, Record). After submitting the response, the student is not able to edit his or her response; however, the response will remain for the duration of the course, providing the student the opportunity to compare the initial response to his or her current understanding of the text.

   "Question-answering instruction encourages students to learn to answer questions better and, therefore, to learn more as they read" (Armbruster, Lehr, & Adler, 2001). Additionally, research shows that "students who are good at monitoring their comprehension know when they understand what they read and when they do not" (Armbruster et al., 2001).

2. The student *writes a reflective response* in a journal that the student can edit or add to throughout the duration of the class (SQ4R = Reflect, Record). This response can be constructed initially in a word processing program and then cut-and-pasted into the online response field.

3. The student *answers multiple-choice questions* by clicking a button. Correct answers generate automatic feedback to the student (SQ4R = Review). Additionally, class responses generate a bar graph that provides the teacher immediate data reflecting how the students' understanding of the text is progressing.

4. Students *construct and discuss an opinion* based on a reading and post it to an electronic bulletin board, to which the entire class must read and respond. (SQ4R = Question, Record, Reflect). Each topic of discussion generates its own thread, providing students with an informal concept map from which they can cooperatively work to understand content-area texts and share comprehension strategies (Armbruster et al., 2001). Thus, students become both learners and teachers.

5. Students *co-construct a document*, using a format somewhat like the bulletin board (SQ4R = Reflect, Record, Review). Teams of students can actively generate authentic products, stimulating metacognitive learning by promoting collaboration, development, and accommodation of multiple opinions, and continual development and revision of the product (Dougiamas, 1999).

   Additionally, teachers interested in data-collection tools for assessing student progress will find several embedded in the program. For example, in the first activity, all student responses are captured in a single file, providing the teacher a class-view of the students' levels of understanding. In the third activity, a bar graph is generated that enables the teacher to determine patterns of understanding or misunderstanding. Some customizable data-collection tools are available as well.

The National Reading Panel's (2002) subgroup report *Computer Technology and Reading Instruction* challenges educators to investigate the potential for reading improvement through technology integration. Using a Web-based courseware program can provide the opportunity to incorporate creative word processing techniques, as well, as to explore using hypertext as an alternative medium for reading and studying. ◆

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Using Technology to Improve Reading Scores and Learning Skills

by Robin Fred, Project Director, ExplorNet

Modern educators often witness something of a paradox: students who can't read at grade level, but nevertheless possess an astounding knowledge of the latest technology. A new middle school reading program called *TechnoReading* is designed to capitalize on students' interest in technology and use it to help students see reading in a different light.

It is no secret that in general, adolescents and teenagers today are far more interested in and knowledgeable about technology than any generation before them. From computers and PDA's to ever-present cell phones, an increasing fascination with gadgets has made information technology almost second nature to many young people at the beginning of the 21st Century. The issue for educators has been to figure out ways to use the resources now available to tap into students' interest in ways that foster learning of core subjects. For educators who teach technology subjects, the challenge is to promote a deeper and more thorough understanding of the underlying technology, not just step-by-step instructions on how to work the latest version of the hottest tech toy.

ExplorNet's TechnoReading was conceived with a lofty goal: to give middle school students a solid introduction to computer technology and to improve their reading and learning skills so they can excel when they reach challenging technology courses in high school and beyond. TechnoReading aims to use

technology and hands-on learning to help low-performing readers improve their tech skills *as well* as their test scores.

The content of TechnoReading (Boudah, Tharin, Gurganus, Boudah, Short, & Carruthers, 2001) focuses on basic computer technology. ExplorNet assembled a team of classroom educators and university-level learning experts to create materials that weave content with research-based teaching approaches from the University of Kansas' nationally recognized Strategic Instruction Model (SIM). The result is a course that promises to help low-performing readers get over the hump and prepare them for highly technical materials they'll encounter in high school technology courses.

A Quick History

ExplorNet is a non-profit agency that works as a partner to the North Carolina Department of Public Instruction as well as several other state education agencies and schools in six states. ExplorNet offers Computer Engineering and Networking for high school students and ExplorIT Camps and TechnoReading to middle school students who want to learn more about technology. The TechnoReading Project originated in 1999, after Computer Engineering Technology teachers relayed numerous stories about previously underachieving students who were doing well in that course. These students liked the subject, understood it, and excelled at it. However, they still fared poorly with textbooks and tests because they simply weren't prepared to read the highly technical material. The combination of active engagement and high-tech subject matter in this new course provides a unique opportunity to reach certain students who could benefit from a different approach.

Developing the Course

The model is built upon a series of academic strategies for reading, remembering, and learning material. The developers, Dr. Dan Boudah of the University of North Carolina School of Education and veteran North Carolina

Department of Public Instruction consultant Mary Anne Tharin, decided to focus TechnoReading on two of those strategies. Paraphrasing involves students reading short texts and paraphrasing their main ideas and details, and the LINCS Vocabulary Learning Strategy employs visual imagery, prior knowledge, and study cards to help students learn and associate new terms. After recruiting a team of SIM-trained middle school language arts teachers and technology teachers, Boudah and Tharin set about the work of creating a one-semester (approximately 80-hour) course.

The TechnoReading Course

The resulting course features four units based on introductory computer engineering content (Introduction to Computers, Computer Fundamentals, Input & Output, Processing & Memory).

The objectives of the course are that students will: (a) explore their personal interests and abilities in computer technology as a career option, (b) demonstrate mastery of basic computer concepts and functions, and (c) demonstrate mastery of specific learning strategies involved in technical reading.

For example, if a teacher wants students to learn about the history of computers using the RAP (Paraphrasing) method, he or she would begin by explaining the objectives of the activity. The teacher would then put the students in pairs, and the students would read the provided passage to each other. While one student is reading, the other will keep track of how well he or she is doing with a paraphrasing score sheet. Once the first student finishes reading the passage, the second student will provide feedback to the reader. At the end of the activity, the teacher would discuss two or three key details to link under the main idea "History of Computers."

Teacher Training

The six-day professional development session includes:

◆ Instruction on using the course materials.

- Preparation for teaching the reading and learning strategies involved.
- Basic computer engineering overview, with hands-on training.

Complete curriculum materials include four unit books, with:

- Step-by-step lessons for the teacher.
- Adapted reading materials, handouts, and activities for the students.
- Background materials from the Strategic Instruction Model, developed at the University of Kansas.

Schools need to provide:

- Three to four computers for teachers.
- A classroom or lab in which to teach TechnoReading.
- Internet access (useful, but not required).
- A teacher comfortable with both technology and reading elements.
  - Language arts teacher
  - Technology teacher
  - Teacher at school's discretion

The teacher does not have to be an expert in computer technology but must have basic knowledge of the subject and a willingness to learn more as needed. ExplorNet provides a mandatory one-week summer training session for new TechnoReading teachers.

Field-testing of various elements of the course was conducted at several North Carolina sites, with encouraging feedback coming from schools like Sampson Middle in the Clinton City School District. "The TechnoReading Program is an exciting way to teach and learn reading in the real world and for students to see how important it is to have good reading skills for future employment," said Glenda Phillips, associate superintendent for program administration for Clinton City Schools. She went on to say, "It is also an innovative way to provide hands-on reading instruction to students who are not on-grade-level readers."

Student progress is measured with pre- and post-testing. Program assessments during field-testing included measures of:

- Comprehension of computer-related information from text selections by written responses.
- Identification of main ideas and essential details in text paragraphs by use of a highlighter pen.
- Verbal paraphrasing of critical information from text paragraphs.

The Results

Early evaluation has shown that the program works best in periods of approximately 50 minutes. It can be instituted as an after-school program or Saturday program. This approach works best in classrooms with no more than 12–15 students. Most importantly, it is most likely to have an impact on students who (a) have an interest in technology, (b) enjoy hands-on activities, and (c) have below-average reading skills.

Results indicated that student scores improved on each of the three variables measured. Scores on the measure of computer-related comprehension improved from a mean of 76.00 to 89.50. Scores on the measure of identification of main ideas and details improved from a mean of 94.00 to 96.88. Scores on the measure of paraphrasing improved from a mean of 92.22 to 96.25 (Boudah, 2001). Clinton City School officials are seeing TechnoReading reaching their students. "I think that it is a great program," says Dr. Gene Hale, Superintendent for Clinton City Schools. "Our children are really benefiting from it. I was talking to the principal at Sampson Middle School who said that TechnoReading was really making a difference in achievement at the school." ◆

Additional information is available at **www.explornet.org** or from Robin Fred at **rfred@explornet.org.**

Teaching Reading in High School: The Crucial Role of Technology

by Sally Humble, English Curriculum Development Specialist, SAS inSchool

How can computer software help secondary school students with reading? Most software for reading instruction focuses on word recognition and basic comprehension in a format that is too juvenile for high school students. Similarly, upper-grade literacy software for special-needs students is generally unsuitable for the regular classroom where instruction is organized around literature. Yet many high school students in standard and even advanced classes have real problems with reading comprehension.

SAS inSchool® software is designed for easy integration into regular English classrooms where students read at different levels but participate in a common program of literary study. Help with reading is crucial for secondary school students because it is the key to classroom success in every subject as well as satisfactory performance on standardized tests.

High school students exhibit a variety of reading problems. Many students can recognize words but cannot grasp complex syntax or paragraph logic. In their struggle to master the sentence, they stumble and re-read to such an extent that they lose the purpose, sense, and meaning of the larger passage. For these struggling readers—and for the class as a whole—the approach taken by SAS inSchool can be very helpful. American Literature Inter-Activities, for example, provide audio readings of literary passages. Students thus negotiate complex syntax with the aid of a reader attuned to the nuances of a particular passage. This approach familiarizes students with content, syntax, and style before they read independently. A mouse rollover for challenging vocabulary provides an immediate definition so that reading can progress even if some words are difficult.

Even when high school readers recognize words, follow the syntax easily, and read aloud a passage with perfect fluency, they can still put down the book and say, "I didn't understand a word I read." Such students are not active readers; they lack the ability to construct meaning as they read. Identifying this reading problem is a slow process, especially since additional testing may be required. SAS inSchool's English software offers a solution for this kind of reading problem as well. Students complete a series of short but logically related reading tasks. Each requires a specific response. Thus, the student's level of involvement and success is constantly clear to the teacher.

If students have mastered the skills of decoding syntax and active reading, they often have difficulty interpreting the more sophisticated texts studied in high school English classes. They do not make inferences or respond to the connotations of words, and they fail to see how authorial tone, attitude, and point of view affect meaning. Even the best high school readers are puzzled by figurative language, misinterpreting metaphors and symbols, or missing the irony or implications of literary selections required by the curriculum. American Literature InterActivities provide interpretive glosses that integrate explanations of literary techniques with insights into the deeper meaning of the

text. As students hear a text, master its vocabulary and syntax, and grasp the literal sense of the passage, they are led to explore literary devices as well. Working through a series of challenging quotations from the best writers of a period, students gradually become not just accurate readers but enlightened readers who discover how literary texts unveil their meaning through the riches of imaginative language.

Finally, all secondary school readers suffer from one universal limitation—their lack of maturity and experience. They have not yet had time to master history, to travel, to thoroughly explore intellectual issues, or to read widely and extensively—all those experiences that inform and facilitate advancement in reading skill. As they approach more adult reading in high school, students require introductions to the cultural contexts of the selections they study.
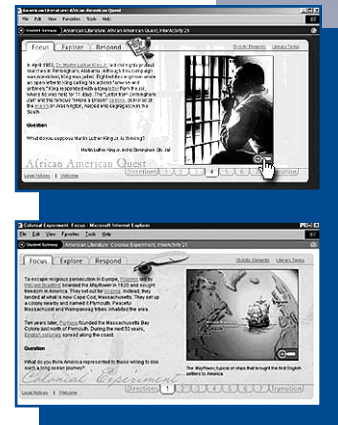
SAS inSchool's software engages students with a rich array of images and background information that places the text in a cultural context. Students who, in the course of a school year, complete eight American Literature InterActivities—Colonial Experiment, Romantic Spirit, Local Color, Modern Dilemmas, African American Quest, Asian American Transitions, Latino American Identity, and Native American Memory—not only gain historical and cultural knowledge but also receive guided practice in crucial reading skills.

At the North Carolina English Teachers Association fall conference in October 2002, Eric Broer of Leesville High School in Raleigh and Mark Mitchell and Amanda Moulder of Raleigh Charter High School described their experiences with SAS inSchool's English software. Broer drew on his experience with Curriculum Pathways® English lessons, which connect meaningful content to Internet resources. Using learning stations in his multi-computer classroom, Broer created a student-centered reading program that focused on student choice and active learning. Students relied on written instructions to guide their daily reading, discussion, and writing assignments, freeing Broer to engage in small-group and one-on-one coaching. Using study questions from Curriculum Pathways as a model, Eric led his students to explore such issues as tone, syntax, and imagery as they read *Ellen Foster*.

Mitchell focused on the comprehensive resources of Curriculum Pathways to fill the gaps and contextualize learning as he moved his class through vastly different regions and historical periods in his world literature reading program. A Web Inquiry lesson on *hubris* from Curriculum Pathways provided a quick introduction to *Oedipus Rex* and the study of Greek literature. Students mastered a complex literary term that reveals Greek values and culture by reading short passages from the play and completing written responses to questions. Mitchell argued that no matter how well-prepared teachers are, the expectation that they cover a wide range of works across world literature means they need help in making reading meaningful and literature units coherent, precisely the help Curriculum Pathways provides. "Students remember and understand the works better if they are linked," he concluded.

Moulder integrated resources from Curriculum Pathways on *The Scarlet Letter* with her own creative approach to the American Literature InterActivity, Romantic Spirit. Challenging her advanced readers to practice literary analysis, she had them study the interpretive glosses for several of the quotations from Romantic Spirit. Since her access to the computer lab was limited, she followed-up this online lesson by giving students a copy of a challenging passage by Ralph Waldo Emerson. She asked the students to write interpretive comments on important phrases or sentences in the passage, modeling their writing on the interpretive glosses they had viewed in the SAS inSchool product. Moulder concluded, "Using SAS inSchool software made me a better teacher."

Tony Infantino and his students at Durant Road Middle School in Raleigh described their use of SAS inSchool software in a STAR Schools Video. One of the students explained the advantages of reading with the software: "When we were using the software, we had the option to watch a little video…. And if there were words we didn't know, we could click on them, and see the definition." Another student stressed the advantage of having access to the interpretive viewpoints provided by SAS inSchool videos and interactive questions. "You learn more about a text," she explained, "by learning that other people see it differently."

Infantino points out that the visuals clarify a text for students. When the response to a difficult passage was, "Mr. Infantino, I have no idea what this means!" he directed his students to the software's visual aids. "You can almost see the light bulb come on," he said. Visual aids provided by the software convey meaning to students when the words alone confuse them, and students become capable of discovering the meanings of difficult texts on their own. For more information, please see www.sasinschool.com/software/americanlit/index.shtml. ◆

Reading and Literacy Web Resources

by Renee Murray, SREB Middle School Language Arts Program, and June Weis, Research Assistant, Educational Technology, SREB

Reading and Literacy Associations and Centers

International Reading Association	www.ira.org	National standards and other resources
National Council of Teachers of English	www.ncte.org	National standards and other resources
Council for Basic Education	www.c-b-e.org	English standards and family resources
American Library Association	www.ala.org	Newbery Award winners, reading lists, and resources for families
National Research Center on English Learning and Achievement	http://cela.albany.edu	Resources and research on middle and high school literacy
Children's Book Council	www.cbcbooks.org	Sponsors of Children's Book Week and Young People's Poetry Week and other resources

Reading Strategies

Helping Your Child Become a Reader (U.S. Department of Education)	www.pueblo.gsa.gov/cic_text/children/child-read/hyc.html	Aimed at the parent and child, there are guides to activities that are applicable to children from infancy through age 6.
Knowledge Loom	http://knowledgeloom.org	Research and practical ideas on teaching, reading, and writing, with excellent online professional development.
National Writing Project	www.writingproject.org	Teacher resources on writing across the curriculum.
Literacy Matters: What Matters Most in Adolescent Literature (EDC)	www2.edc.org/literacymatters	Promoting adolescent literacy development is just one of the reasons for this excellent web site.

Reading is Fundamental (RIF) (U.S. Department of Education)	www.rif.org	Founded in 1966, RIF develops and delivers children and family literacy programs that help prepare young children for reading and motivate school-age children to read regularly.
Reading Online	www.readingonline.org	A free online publication of the International Reading Association.
Reading Quests (University of Virginia, Curry School of Education)	http://curry.edschool.virginia.edu/go/readquest/links.html	This is a general list of links to resources about content reading and comprehension strategies.
The Reading Room (Doug Buehl)	www.weac.org/News/reading.htm	A teacher offers reading strategies for high school.

Reading Lists

Arrowhead Library System, College Bound Reading List	http://als.lib.wi.us/Collegebound.html	Created for patrons of the Arrowhead Library System in Wisconsin, this college bound reading list includes American literature, world literature, biography/history, science, drama, and poetry.
Choices Booklists (International Reading Association)	www.reading.org/choices	Each year, thousands of children, young adults, teachers, and librarians around the United States select their favorite recently published books to be included in the Choices annotated booklists.
EvaluTech—Instructional Resources	www.evalutech.sreb.org/InstResources/index.asp	Many links to language arts resources are included. Click on Reading Lists and Other Core Literature Resources.
Fairrosa Cyber Library of Children's Literature	www.fairrosa.info	Resources on numerous authors that are not easily found elsewhere, with links to reading lists that link to many electronic texts (classics, fairy and folk tales, stories and rhymes, etc.).
Great Nonfiction for All Ages	http://coe.sdsu.edu/bmoss	Click on List of Lists. Also included are Nonfiction Read Alouds and Great Nonfiction for Sixth-Graders.
Habits of Mind Student Book Lists	www.ascd.org/publications/books/hom_booklist.html	This booklist complements the Association of Supervision and Curriculum Development's (ASCD) Habits of Mind: A Developmental Series.
International Children's Digital Library	www.icdlbooks.org	Kids from all over the world can find books from many different countries and read them online.
The Internet Public Library (University of Michigan School of Information)	www.ipl.org/teen/teenread	IPL offers a wide variety of booklists in Teen Space. Books that are in the public domain are full-text online.
100 Best Books for Kids (National Education Association)	www.teachersfirst.com/100books.htm	Book and author links to any TeachersFirst resources, and lesson ideas are also included.
CyberGuides by SCORE (Schools of California Online Resources for Education)	www.sdcoe.k12.ca.us/score/cyberguide.html	CyberGuides, arranged by grade level, are supplementary, standards-based, Web-delivered units of instruction centered on core works of literature.
Teachers Language Arts Novel Guides (McDougal-Littell)	www.mcdougallittell.com/disciplines/_lang_arts/novelguide.cfm	Literature connections and related reading resources are provided in these teaching guides to many familiar young adult titles.

Teaching Information Literacy Skills

Big6™Matrix: What's New (Big6, Janet Murray)	www.big6.com/ showarticle.php?id=175	Just what are the Big6 skills and how can you align them with national standards? Apply Big6 Skills, NETS for Students, and National Information Literacy Standards (ALA/AECT) to Internet research.
EvaluTech—Instructional Resources	www.evalutech.sreb.org/ InstResources/index.asp	Many links to language arts resources are included. Click on Information Literacy and Technology Integration – Language Arts.
Information Literacy and Library Skills Resources	www.school-libraries.org/ resources/literacy.html	Links are provided to general information, library instruction, online evaluation and information literacy skills for using the web, and web page evaluation and instruction.
Information Literacy Skills Used in Baltimore County Public Schools Research Lessons	www.bcps.org/offices/lis/models/ tips	Arranged by skills that students should know, these lessons include the basic topics of information literacy.
Information Literacy (ALA/AASL)	www.ala.org/aaslTemplate.cfm? Section=Resource_Guides& Template=/ContentManagement/ ContentDisplay.cfm&ContentID =15288	These resource guides for incorporating information literacy into the curriculum are provided by the American Association of School Librarians. Check out the KidsConnect KC Tools.
Integrating the Big6™ and International Society for Technology in Education Nets for Students	http://fp3e.adhost.com/big6/ enewsletter/archives/e2_n3/ beyer_spitzer.shtml	This is a guide for correlating the Big6 skills with national standards.
Lesson Plans and Teaching Activities for School Librarians	www.libraries.phila.k12.pa.us/ lion/lessons.html	Lessons and activities useful in school libraries, links to library and information skills curriculum documents, and related books and periodicals are featured here.
Library Information Literacy Research/Internet (Seeds University Elementary School, UCLA)	www.ues.gseis.ucla.edu/library/ library_researchtools.html	Links to directories, search engines, information literacy websites, and templates for teaching the research process are included.
North Carolina Department of Public Instruction: Information Skills Curriculum	www.ncpublicschools.org/ curriculum/information/ strategies/index.html	These literacy integration strategies for K–8 students in North Carolina public schools are aligned with the Information Skills Curriculum.
SCORE History/Social Science; Information Literacy Skills	http://score.rims.k12.ca.us/ infolit.html	SCORE provides information literacy skills specifically related to history and social science.
Selection Criteria; How to Tell if You Are Looking at a Great Web Site (ALA)	www.ala.org/ (In Search box: Great Web Sites for Kids)	This is a good guide to assist parents and teachers in choosing appropriate websites.
21st Century Literacies (SBC Knowledge Network Explorer)	www.kn.pacbell.com/wired/ 21stcent	Four 21st Century Literacies are identified: information, media, multicultural, and visual. Lessons for building key skills are identified by grade level.

Reading Achievement Module

by Elizabeth D. Holmes, Columbus (GA) State University, and Tricia W. Cooling, Educational Technology Training Center, Macon State College
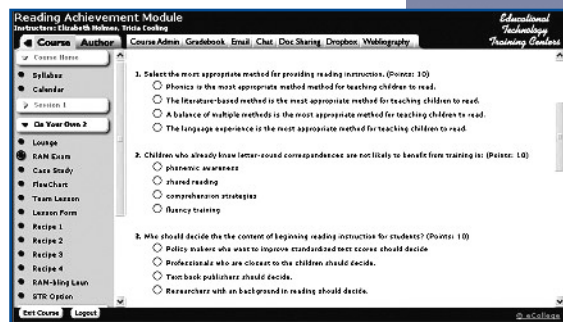
The Reading Achievement Module (RAM), a pilot project of the Educational Technology Training Center (ETTC) at Columbus State University in Georgia, is a technology-enhanced reading professional development program that equips pre-kindergarten, kindergarten, first-, second-, and third-grade educators with the skills and tools to provide data-driven reading instruction in response to students' diagnostic instructional needs. This one-year, school-based reading improvement program is grounded in the research-based findings of the April 2000 Report of the National Reading Panel: *Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction*, the primary reference for scientifically-based reading research. The RAM Program meets professional development requirements defined under the No Child Left Behind Act of 2001 (NCLB) and shares the NCLB legislative goal: "All children will read at or above grade level by the end of third grade." School systems participating in the RAM pilot project are using federal NCLB funds under the following titles to pay for RAM training services and the program software:

◆ Reading First—Title I: Section 1201

◆ Improving Teacher Quality—Title II: Section 2402

◆ Enhancing Education Through Technology—Title II: Section 2402. a.4&5

◆ Innovative Programs—Title V: Section 5101

The RAM Program is delivered to school faculties through eight comprehensive training modules using a modified online learning format. This delivery model includes hands-on training, online learning and collaboration, and classroom implementation requirements that ensure transfer of professional development content to classroom practice. Four modules are delivered as full-day, face-to-face training sessions conducted in a modern computer laboratory by qualified RAM Instructors. Educators are taught to use online resources, productivity software, and tool-based and instructional applications in the context of learning scientifically based strategies and methods for teaching young children to read. Four modules are delivered asynchronously through an online course delivery system. The asynchronous segments define a series of tasks requiring teachers to apply the skills learned in the training seminar. The tasks are accomplished as individual learning assignments, as collaborative efforts among grade-level teams, and as teacher-tasks through case study and action research assignments in the teacher's own classroom with reading students. Educators use discussion boards to share new ideas and experiences with colleagues.

The Reading Achievement Module presupposes that highly qualified reading teachers are the critical factor in determining whether or not the nation's children will read. The RAM Program employs learner-centered design principles to ensure that participants acquire the knowledge and skills that the Georgia Professional Standards Commission identified to strengthen and enhance the basic competency of classroom reading teachers. Teacher's knowledge of the National Reading Panel's five essential components of reading is assessed using online tests. Educators participate in professional development to become highly qualified reading teachers, while simultaneously developing agility with the technologies needed to remain current in their practice and informed in emerging knowledge about reading and literacy. Although the primary goal of the RAM Program is
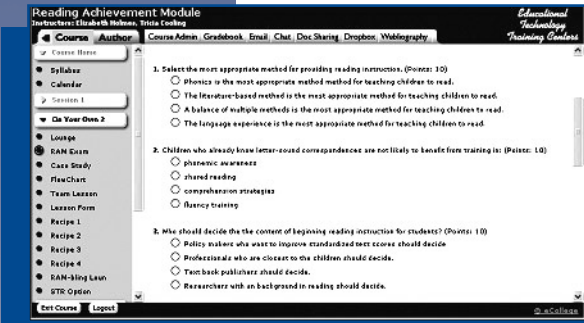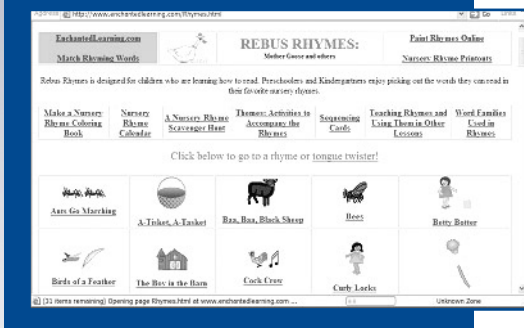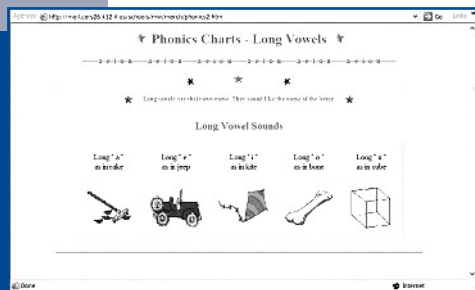
to prepare quality reading teachers, the tools used throughout the program are technological. Educators completing the RAM Program will become comfortable using a variety of modern technologies and will move toward proficiency in meeting the National Educational Technology Standards (NETS) identified by the International Society for Technology in Education (ISTE).

The RAM Program takes advantage of proven software applications that were selected for their research-based efficacy and potential for improving student achievement in reading. Among the software applications being used in the pilot of this program are:

◆ *Comprehensive Reading Test* published by Lexia Learning Systems, Inc.

◆ *Fantastic Phonics* published by Momentum Multimedia: Early Reading Company

◆ *Joseph Readers* and *Failure Free Print Materials* published by Failure Free Reading

◆ *Tenth Planet Literacy Series* published by Sunburst Technology

◆ *Writing with Assessment* published by Orchard

The availability of high-quality online references and resources strengthens the RAM Program. Online resources expand the number and variety of instructional materials available to teachers, parents, and students. The course webliography, which consists of over 130 entries, enhances face-to-face instruction, offers references for teachers completing classroom assignments, provides activities for students, and supports parents as they extend reading instruction at home. The full RAM webliography is available online at **http://ettc.colstate.edu/ram/webliography.htm.**

After two years of field-test activity, the RAM Program is being piloted in two Georgia school systems to measure its impact on student learning over time. During the 1999–2000 academic year, data from RAM field-test activities implied promising trends in vocabulary acquisition and subsequent comprehension gains for third-grade students as measured by the Iowa Test of Basic Skills. Interestingly, the data affirm a high positive correlation between the sophistication of the school's technological infrastructure and improved student learning. Schools 1, 2, 3, and 4 were equipped with classroom computers, local area networks, and high-speed Internet connectivity. Schools 5 and 6 encountered technical challenges related to hardware, software, connectivity, and technical support. The implications are clear: explicit technical preconditions are prerequisite to successful implementation of a technology-enhanced reading professional development program that is expected to impact student learning. ◆

Examples of Resources
Posted to the RAM Webliography

Category	Resource
Content Knowledge	Preventing Reading Difficulties in Young Children. M. Susan Burns, Peg Griffin, and Catherine E. Snow, Editors, and the Committee on the Prevention of Reading Difficulties in Young Children et al., National Academy Press; ISBN: 030906418X; June 1998. **www.nap.edu/books/030906418X/html/index.html** Starting Out Right: A Guide to Promoting Children's Reading Success. M. Susan Burns, Peg Griffin, Catherine E. Snow, Editors, and Betty Alberts and Bruce Alberts, National Academy Press; ISBN: 0309064104; January 1999. **www.nap.edu/books/0309064104/html/index.html**
Instructional Materials	Early Reading helps children learn to read using an explicit Phonics approach as the starting point of instruction. The program is downloaded from the Internet or purchased on CD-ROM. The stories are printed from your computer and can be stapled to form a booklet. **www.early-reading.com./home/samples.html** Book Adventure is a reading incentive program dedicated to encouraging kids in grades K–8 to read. With the help of Rex Reader and Bailey Bookmark, kids have more than 5,000 of the most popular and acclaimed titles from which to choose. Book Adventure was created by the Sylvan Learning Foundation and is a non-profit organization. **www.bookadventure.com**
Student Learning Resources	iKnowthat.com. ABC Reading. Word Search. As you find hidden words, hear them being spelled and see fun animations. Word Builder—Explore sound patterns by making words. Hear a word, see it in a sentence, and watch an animation. Word Match—Discover word meanings by matching words with animated pictures. **www.iknowthat.com/com/L3?Area=WordSearch&COOK=** Story Creation. Sears Portrait Studio (2001). Story Creations and personalized letters are customized with the student's name. Just choose a story or letter and answer a few short questions. When you click on the "submit" button, the Story Creation or personalized letter will appear on the screen, complete with illustrations that can be printed. **www.searsportrait.com/storybook/storybook_storyindex.asp** Alexander and the Terrible, Horrible, No Good, Very Bad Day. Kennedy Center for the Performing Arts. The Kennedy Center sponsors an online adaptation of Alexander, read by Judith Viorst, with original illustrations. **http://kennedy-center.org/programs/family/alexander/intro.html**
Teacher Reference Materials	Sight Words. This section has various free materials for Dolch sight words. All the Dolch materials have a key made of dots to distinguish between each reading level. There are Sight Word lists, Phrases lists, Noun lists, 3 x 5 cards, Checklists, Sight Boards, Take Home Cards, and Word Searches. **www.createdbyteachers.com/sightfreemain.html**
Parent Connections	Compact for Learning: School-Home Links. A joint project of the U.S. Department of Education, the Corporation for National Service. The Compact for Reading Guide offers tips on creating community and family-school partnerships with the purpose of improving children's reading. The School-Home Links Reading Kits are a collection of research-based activities designed to help families reinforce the reading and language arts skills that their children are learning at school. **www.ed.gov/pubs/CompactforReading**

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