New Audio Technology Partners to Support Authentic Literacy Development

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Introduction

Research indicates that the sheer quantity of reading has a major influence on reading development. Readers who read more become better readers in a cycle that promotes increased fluency and comprehension, as well as an appreciation for the benefits of reading. A conundrum emerges when working with young learners who are just learning to read. Many of these children are developmentally ready to begin comprehending and discussing good stories, but have low decoding skills to process the written text. A new, low cost technology has been developed to provide students with a reading partner that helps students engage in reading. The partner can read text, provide help with vocabulary, and model good questioning to foster comprehension. This paper presents a theoretical perspective for engaging young students in good reading habits in conjunction with practicing basic decoding skills. A unique and affordable audio compact disc controller provides students with the ability to request predefined verbal help with stories. An example is given to demonstrate how this technology can be used to develop literacy skills in the classroom or at home. The potential for this technology can easily be realized in other domains, such as math and science, where students are ready to advance in other skills, but are still developing their basic decoding skills.

This paper has three main sections. First, we explore what kinds of scaffolding are necessary for creating good literacy habits. Next we discuss the development of a computer based learning environment, called the Young Children's Literacy Project, designed to facilitate students' deep comprehension of stories. Also we provide a description of a new, low cost technology designed to supply verbal support on demand. Finally, we discuss specific examples from our initial evaluation of independent and small group activities designed to promote fluency and discussion skills in literacy using this new technology in a classroom environment.

Understanding Educational Problems, Issues, or Effective Strategies

Much of the concern about literacy in this country is related to the large number of high school graduates who are not illiterate -- that is, they have acquired basic letter-sound skills that enable them to read simple texts. However, they are "low literate" in that they fall short of the ability to work with ideas and complex vocabulary in high level texts [Pressley & McCormick, 1995]. Achieving this higher level requires students to move beyond basic

decoding and to develop reading skills through large quantities of reading in and out of school. This requires the development of high motivation for choosing reading over other activities.

Recent research has highlighted the need to focus on reading habits as well as reading skills in early literacy instruction. For example, Stanovich & Cunningham [1992] were able to quantify that large amounts of print exposure lead to increased verbal abilities, even when children are equated on decoding ability or general cognitive ability. In summarizing his findings, Stanovich argued strongly in favor of instruction that explicitly fosters positive reading habits and attitudes. Pressley and McCormick [1995] reviewed other research that shows "better readers do in fact read more" and "by doing so they make themselves even better readers." Therefore, students need multiple opportunities to practice reading to develop the habit of reading.

Along with the desire to read must come the ability to think about the story and to recognize and discuss its important features. One design consideration for a literacy curriculum might include the nature of the conversational level children should be able to perform [Applebee, 1993]. "Literate talk, usually conversational, is not often heard in classrooms of the schools we have. Instead, interrogation is the most common form of discourse between teachers and students. Until we realize that question asking does little to foster thinking and that question answering provides little good evidence of understanding, we should not be surprised that only few students ever develop advanced literacy proficiency" [Allington, 1994]. We need to promote a method that encourages students to ask questions while they read.

In the 1985 Becoming a Nation of Readers report [Anderson, Hiebert, Scott, & Wilkinson, 1985], the Commission on Reading concluded from its review of two decades of reading research and practice that "The single most important activity for building the knowledge required for eventual success in reading is reading aloud to children . . . it is a practice that should continue throughout the grades" [Anderson, Hiebert, Scott, & Wilkinson, 1985]. Clearly, the best way to build lifelong reading habits would be for each child to have a personal reading partner (adult or older child). This partner reads stories to the child that are above the child's reading level or slightly above the child's comprehension level. As they read together the partner could explain new vocabulary or engage in "literacy talk" about the stories. This literacy talk, or conversation, would model for the young learner how to draw links from the stories to other books, or personal experiences. In addition this conversation could provide models of how to ask high level story questions, make predictions, draw inferences, and empathize with story characters.

Ideally, this personal reading partner would be a caring adult or older sibling in the home. Unfortunately, it is often difficult to provide personal reading partners at home and school. Teachers have time constraints that do not allow them to give large amounts of individualized instruction to all their students. Many caring parents lack the necessary literacy skills to be optimal reading partners. Other factors associated with poverty may also make it difficult for children to find a personal reading partner at home.

Students need opportunities to engage in meaningful, independent activities that encourage the development of good learning habits and opportunities to practice reasoning skills. Technology applications typically focus on the basic skills by providing "drill and practice" activities. This support for basic skills needs to be supplemented with scaffolds that will build motivation and access to reading materials at school and in the home. A "catch-22" in promoting these habits early has been that children with few skills cannot independently practice reading many interesting texts at their comprehension level or discuss them without support. However, a low cost technology to support reading and understanding may provide a mechanism for students to practice their reading and discussion of stories. New approaches for implementing technology provide some insight towards developing life-long learning habits in young children.

Young Children's Literacy Project

During the past several years we have developed a computer based literacy program, called the Little Planet Literacy Series, designed to foster students' deep comprehension of stories [Sharp et al, 1994]. Over time, students systematically explore a video based anchor story by creating a multimedia book to retell the story. The combination of the video story and the creation of the book provides an authentic task that allows students to appreciate the use of books and reading. Analogous stories to the original video anchor allow students to make analogical comparisons to help them comprehend and anticipate key events in the target story. These rich, computer based activities have proven to be highly effective on students' story understanding and highly motivating to students.

Students need multiple opportunities to engage in these types of activities to gain fluency. The book making activity is mediated by an adult who coaches the students through the process. Typically, the teacher will work with a small group to sequence the main points of the story and then generate a retelling of the story. This

provides the teacher with the opportunity to model a variety of skills including question asking, predicting and writing. In addition, the Little Planet Series includes a variety of other activities that support students' independent interaction with text and pictures. For example, a collection of "little books" provides students with a library of stories with a range of difficulty. Like other computer supported books, students can select passages that the computer "reads" to them. In the Little Planet Series students can record themselves reading the story once they gain fluency. Another activity revolves around "Story Starters", where students generate their own text and pictures to complete the ending to a story.

These computer tools provide students with the support they need to participate in meaningful literacy activities without adult mediation. Unfortunately, a limited amount of computer resources make it difficult for all of the students to participate simultaneously in these activities while the teacher mediates the book making activity with a group. Therefore, one classroom organization method uses a "centers" method where an adult works with a small group at a computer. The rest of the students engage in activities they can perform independently. Our goal is to make these independent activities richer than simple manipulative style activities, like arts and crafts, or completing worksheets for drill and practice of basic skills.

Audio Compact Disc Player Controller

Many meaningful activities can be created for independent and small group activities with a small amount of verbal assistance. A low cost technology prototype has been developed to explore the benefits of providing audio help to students engaged in activities that support the development of fluent reading skills and reasoning capabilities.

A special controller has been developed to access and play specific portions of an audio Compact Disc (CD) using a conventional CD player [Brophy, 1994]. The controller serves to access audio information from the CD in a non-linear fashion. A 10 digit key pad provides an interface for a user to access audio information by entering a 2 digit code. Children or an adult partner can use the simple key pad interface along with a traditional book and companion CD. Two digit codes (e.g., "15") are placed at various areas of the book's pages. Students can enter a particular code to hear the page read, hear a vocabulary word explained, or hear characters asking good questions, making predictions, drawing inferences, and engaging in "literacy talk" about the story. Students can enter each code as often as they like. This means that unlike a tape-recorded version of the story, the companion CD provides children with the power to re-hear any page multiple times as they try to read it themselves, or re-play particular comments of the story quickly and easily. Children can also go back to refer to any page at any time during the story. Parents with low literacy skills can use the CD to supplement their own reading of the story and their own questions. Over time, the modelling provided by the CD has the potential to increase the quality of the reading interaction between parents and children.

We see the potential for many curriculum materials to be developed whose potential would be greatly enhanced by the audio support provided by the player. For example, students could receive verbal help while they read by simply keying in a two digit code. Students' inability to read used to eliminate many meaningful, motivating learning opportunities for some students, even though developmentally they were able to successfully participate in the activity. The CD controller provides a mechanism for students to engage in learning activities that were previously out of reach due to their low literacy. It also provides them with multiple opportunities to experience the benefits of reading before they've mastered reading themselves.

Over the past year we created materials to capitalize on this CD controller technology. The original effort focused on literacy habits; however, we have also expanded into math and science activities. The follow section outlines several of the literacy activities and the hypothesized benefits.

Fostering Good Literacy Habits Using Technology in the Classroom

Little Books

We have developed several prototypes of the CD Reading Partners and piloted them in classrooms. We began our development by creating audio support for the "little books" contained in the Little Planet Series. The books were printed and the audio support was recorded on conventional audio compact discs. Two digit codes were assigned to each page of the "little book" which allowed students to hear the text of a single page. The goal of our

initial investigation of the control targets how well students learn to use it and how they use the CD controller to monitor their own reading. Students were shown how to use the CD controller through a whole class demonstration. They were given the challenge to learn to read the book well enough to read it to the class. Over several weeks all the students visited the center to practice reading. Once they mastered reading the book they could keep the book and take it home to read to their parents. The students had little difficulty with the interface and were self regulating in minutes. In fact, on a couple of occasions a student would enter the wrong code. Typically, they would capture their own error by noticing that the number on the CD player's display did not match the intended code. The students enjoyed the activity and many were able to read the "little books" after several center time sessions.

During the past year the CD controller has been used in the classroom to support students' reading of the "little books". Systematic assessment of students' performance is not available for press. However, review of field notes indicates interesting trends in students use of the "little books". The simpler stories contained in the "little books" library have no real plot, but use simple rhymes to motivate the students reading. Typically each page includes one or two short sentences. In some instances students listen to the story repeatedly until they have memorized the story. When they "read" the story for themselves they appear to use the pictures as a recall mechanism. This technique fails as they students graduate to more difficult stories in the library. However, initial assessment indicates that students are not discouraged and develop new strategies for reading the more challenging story.

Other students practice reading by reading aloud with the audio. As they gain mastery of the text they use the controller only as a reminding device. If they find a word they cannot pronounce, they access the audio information and follow along until they reach the desired word. Although this method of word level assistance is not as efficient as using the computer version, this method has other benefits. First, the method is created by the students. They were never explicitly taught to use the controller to help them understand a word. Second, it encourages students to follow along as they listen to the audio information read to them which further reinforces the sight recognition of the word. This indirect method may be more powerful than immediate direct assistance for each work. Especially when students are moving away from high support computer programs toward independent reading of printed text.

As mentioned earlier, students participate in this activity to be able to read to the class. Students are very excited to participate in an event called "Showcasing". At various times during the week students present "products" they have created during center time activity. These "products" can range from their multimedia books to their ability to read or discuss a story. Typically, student volunteer to stand in front of the class and showcase their products. Their excitement and willingness to read indicate their motivation and confidence they are achieving.

Literacy Talk

Other important literacy habits include the ability to think about the story and to recognize and discuss its important features. Students need opportunities to learn how to make sense of stories in authentic literature. They need to learn how to make predictions, ask question about what they don't understand, and make comparisons to other stories. A second example of the audio information on our CDs uses the award winning picture book, "Seven Blind Mice" by Ed Young [Young, 1992]. Young's book recasts the folktale of the blind men and the elephant, so that mice guess the identity of an elephant beside their neighboring pond. Figure 1 shows page 5 with the index codes placed on the page. The red blind mouse returns to his friends after observing the elephant's leg. The text reads:

> "It's a pillar, he said.
> No one believed him.

There are 3 codes on this page: (05, 65, and 66). Code 05 reads the text. Codes 65 and 66 play comments from two of our original characters whose faces appear next to the codes. One character asks a question about a difficulty word:

> "What's a pillar?" (Code 65)

The other character provides an answer

> I think it's like a big post on some buildings. Like in front of our library -- there are pillars by the steps. (Code 66).

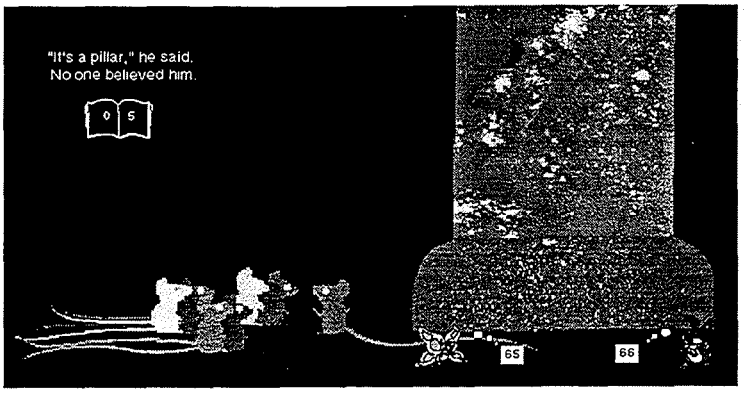

Figure 1 : Example of code layouts

On other pages, the characters model other types of literacy talk. The final page of the story, see [Fig. 2] contains comments that address vocabulary and also help to clarify the major theme of the story. The text reads:

> The Mouse Moral: Knowing in part may make a fine tale. But wisdom comes from seeing the whole. (Code 36)

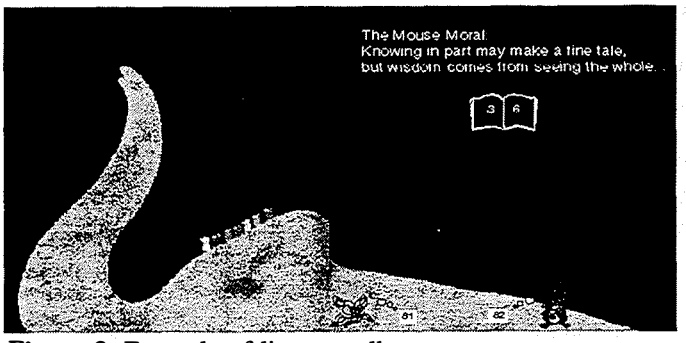

Figure 2: Example of literacy talk

The comments are as follows:

> Character 1: What's a moral? (Code 81)
> Character 2: It's something that tells what a story is really about. So this story is really about being wise when you look at the whole thing, not just a part of something. (Code 82)

At the end of the story, 5 of our original characters model a good book talk about the story. The book talks include comments that describe enjoyment and emotional engagement, pleasure at new words or phrases learned in the story, connections to personal experience, and connections to other stories. The CD controller provides just enough help for students to practice their reading and literacy skills.

Conclusion

The benefits of this learning situation could be quite powerful. Our initial informal assessment indicates interesting methods students invent to help their understanding of a story. We have observed an increase in students' ability to read books in the "little books" library. Their eagerness to read to the class demonstrates their confidence and motivation for reading. We currently plan to assess the impact of these Personal Reading Stations on children's developing habits and metacognition about reading. In addition, we plan to assess the impact of the Personal Reading Stations on parents' literacy interactions with their children over time.

Our current development aims include creating multiple "Personal Reading Stations" in classrooms and developing a model for using the Personal Reading Stations with parents and children that would allow parents to

borrow portable CD players. These low cost reading stations provide a method for helping students make the transition from high level support of reading to independent reading of printed text. In addition, we are exploring other activites for students to develop other skills that they ready to learn but are limited by the lack of access to knowledge because it is only accessible through text.

This access to literacy activities has the potential to encourage young learners to view reading as a fun and necessary endeavor that they will seek out on their own.

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